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Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #4

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1. EXECUTIVE SUMMARY

This report is the fourth Market Progress Evaluation Report (MPER) of the Northwest Energy Efficiency Alliance's (NEEA's) NW Ductless Heat Pump Project (Initiative). NEEA launched the Initiative in 2008 as a pilot that set out to demonstrate that ductless heat pumps (DHPs) were a viable technology to displace electric resistance heat in existing homes. The full Initiative launched in 2010.

The Initiative is a market transformation effort that works to promote product availability and to build consumer and market awareness for DHPs. The Initiative places concerted effort on "pushing" equipment through the midstream (installer) and upstream (manufacturer and distributor) markets. The Initiative also includes a consumer-focused marketing strategy in an effort to create demand (or "pull") from the consumer.

The Initiative works to engage installers by encouraging them to become Master Installers. Master Installers are required to participate in Orientation and Best Practices training and install a minimum number of DHPs in the last three years (see Appendix A for more details on Master Installer requirements). Master Installers then receive benefits through the Initiative such as preferred listing on the Initiative's GoingDuctless.com website.

The evaluation findings within this report are based on: a) telephone surveys of households that purchased DHPs through the Initiative in 2014; b) a review of findings from the recently completed DHP message testing study[1] for insight into non-participating households; c) surveys of Northwest DHP installers, and; d) in-depth interviews with program staff, participating Northwest utilities, and DHP supply chain partners. The report also includes updated data on the DHP market in the Northwest.

Progress Towards Market Saturation Goals

The goals of the Initiative are developed around the overall objective of reaching 85 percent market saturation[2] for DHPs in single family homes with zonal heat or electric forced air furnaces by 2029. ILLUME estimated the potential market size for DHPs replacing zonal and electric forced air furnaces in the region is 728,047. This estimate is based on data collected in the 2010 Residential Building Stock Assessment (RBSA)[3] completed by Ecotope on behalf of NEEA, and considering the incented installs of DHPs in the years prior to the completion of the RBSA[4].

[1] ILLUME Advising. 2014. Consumer Messaging for Ductless Heat Pumps and Heat Pump Water Heaters.
[2] NEEA has defined the target market as existing single-family homes with zonal heat.
[3] Ecotope, Inc., 2012. "2011 Residential Building Stock Assessment: Single-Family Characteristics and Energy Use." Prepared for the Northwest Energy Efficiency Alliance. September 18, 2012.
[4] The total eligible homes identified in the Ecotope RBSA plus those homes that had received DHP incentives through the DHP pilot period that occurred prior to the completion of the Ecotope RBSA equaled a total of 222,981 electric forced air furnace homes and 505,066 zonal heat homes for a total market of 728,047 eligible homes in the region prior to the launch of the DHP pilot or full Initiative.

In total, since the Initiative launch, utilities have rebated 36,158 DHPs in Northwest homes. An additional 60,991 units were reportedly installed and non-incentivized since the Initiative launch (48,152 heating and cooling and 12,240 cooling-only units)[5]. Based on the total market size of 728,047, all incented and non-incented units combined represent market saturation of 13 percent.

The prior three years saw an increasing upward trend in the number of DHPs installed through the Initiative; utilities that participated in the Initiative installed 5,289 units in 2012, 7,688 units in 2013, and 8,701 units in 2014. The number of non-incented units has increased annually, from 10,744 units in 2012 to 16,189 units in 2014[6]. Between the incented and non-incented installations, NEEA is progressing towards the goal of 85% market saturation for DHPs by 2029.

Market Progress

Overall, NEEA's NW Ductless Heat Pump Project is well designed and continues to have a positive influence on the market. General population awareness of DHPs has stayed fairly steady since 2013 and households are continuing to learn about DHPs from a wide variety of sources. Respondents noted that friends and acquaintances are the primary source of information with utility information and installers following.

Households that responded to the general population survey noted that customer reviews (either found online or elsewhere) would be an important source of influence in their decision to purchase a DHP. This finding is a new insight since the last study.

There continues to be interest in DHPs with eight percent of the general population saying they will definitely install a DHP and 85% saying they will consider a DHP purchase. This is consistent with the feedback from installers and distributors who are predicting continued DHP market growth. The primary barriers to adoption are similar to what was found in the last MPER and include installation costs, public awareness and understanding of DHP technology, and aesthetic concerns. Following are some additional key findings from this evaluation:

1. **Customers' interest in DHPs is increasing.** Installers reported that the number of customer requests for DHPs increased from the prior year. The percentage of installers that reported this higher interest increased from 43% in the prior MPER to 52% in this study.
2. **Customers continue to rely on others as a central point of information.** Word of mouth and information from acquaintances remain the primary source of initial information on DHPs.
3. **Customers are becoming more likely to rely on their own research than installer recommendations in their decisions.** Installers' influence on customers' decisions decreased from the last MPER while reliance on internet research and other customer reviews has increased.

[5] Source: Data up through 2013 is based on "Estimated Installs for 2013.xlsx" provided by NEEA; 2014 data is based on information provided by CLEAResult.
[6] Includes cooling-only applications.

4. **Households that installed DHPs continue to have high satisfaction with the product and recommend the product to others.** Almost 95% of participants said they were satisfied or very satisfied with their DHP. In addition, over three-quarters of respondents say they have recommended a DHP to others. This is important given how much importance households place on recommendations and reviews from others. These recommendations may be instrumental in further promoting the adoption of DHPs in the market.
5. **Aesthetics with DHPs is less of a barrier for purchasing a DHP than anticipated and does not remain an issue post-installation.** Both installers and participants cite aesthetics as a barrier but participants indicate they quickly move past aesthetic concerns post installation.
6. **NEEA's Initiative continues to drive market transformation among DHP suppliers and installers.** Suppliers want to continue cultivating partnership channels with the Initiative including coordinating on marketing. About half of the suppliers indicated that the Initiative directly influences their marketing and that they dedicate marketing efforts to incented products. In addition, the non-incented savings analyses shows an increase in the number of non-incented units being installed in the market which aligns with the data tracked by CLEAResult, the Program Management Contractor (PMC).
7. **Master Installers are proving to be a strong driver for activity through the Initiative and tend to be more sophisticated in their DHP business than other installers**. Master Installers are more likely to: have been offering DHPs longer; install more DHPs on average; report a higher percentage of their revenue from DHP sales, and; use Initiative marketing materials and the Initiative website to communicate about DHPs to customers. Nearly 40% of Master Installers installed more than 20 units in 2014 compared with 98% of other installers that installed 20 or fewer units in 2014[7].
8. **Installers and other market actors interviewed believe the manufactured homes market continues to have high, untapped potential.** In the last two years installers have nearly doubled their recommendations for DHPs for customers living in manufactured homes.
9. **Average residential install costs for a single indoor head, single outdoor unit (1:1) installation is staying steady at about $4,000.** Suppliers do not believe Initiative rebates are inflating prices in the region nor do they expect costs to decrease in any significant way in the near future.
10. **The newly revised logic model is clear, relevant and evaluable.** The Initiative is making progress on the short-term market progress indicators as evidenced by increases in consumer adoption, supply chain adoption of 1:1[8] displacements, and aesthetics becoming less of a concern. There is also evidence of increased awareness and interest and diminishing concerns

[7] Based on the Initiative database provided by CLEAResult which contains data for the 28 utilities for which they processes rebate applications. See section 4 for more details.

[8] As defined, 1:1 displacements are those where there is one outdoor unit with a heat exchanger and compressor, which does the actual heat extraction, and one indoor blower unit which blows warm (or cool) air directly into the home and that this 1:1 is enough to displace the previous primary heating system used in the home. One-to-one DHP systems have one outdoor unit or compressor and one indoor unit or air handler.

around DHP performance which are key components to increasing purchase funnel[9] activities, identified as a mid-term outcome.

To continue building on the Initiative's success, NEEA should:

1. **Identify strategies for engaging more installers to become Master Installers.** Master Installers dedicate more time and hours to the technology and drive significantly more volume of units than other installers. Identifying strategies to increase the numbers of installers who become Master Installers will theoretically increase volume of DHP sales and help in achieving the long-term market share goals. Future studies should explore the barriers installer perceive to becoming Master Installers.
2. **Continue to identify means to support installers (with particular focus on smaller organizations) and to encourage a higher number of installations per installer**. Per information from CLEAResult, a considerable portion of installers installed 20 or fewer units per year; in fact, nearly half of the Master Installers, and 98 percent of other installers, installed 20 or fewer incented units in 2014. Additional investment should be made in increasing the number of units installers are installing through the Initiative. For example, smaller installers indicate they want more support and training. Partnering with the distributors to include information on the Initiative in their trainings may help reach the smaller installer markets. This strategy could also be an effective way to increase the number of installers involved in the Initiative and the number of units being installed.
3. **Focus on increasing outreach to retailers.** A goal of the Initiative is to increase the availability of DHPs at retailer, in order to achieve this, additional emphasis should be placed on developing strategic partnership and relationships with retailers of DHPs in the region[10].
4. **Continue to think about what the next step is in the market transformation continuum for DHPs.** The Regional Technical Forum provides a central source of energy savings data and assumptions for measures commonly installed in the Northwest, including DHPs. Measure-level assumptions are revisited periodically to determine if adjustments should be made for issues such as changing baselines and standards. There is discussion that DHP savings may be reduced per the Regional Technical Forum which is raising concern over the future of the Initiative. Making DHPs a viable, long-term product will require getting a larger portion of installers to make DHPs a primary component of their business model and/or looking at lower cost mid-stream approaches to incenting market transformation.
5. **Reassess the 85% by 2029 market penetration goal.** Assuming an eligible market of 728,047 households, the penetration of DHPs in the market is currently 13 percent (97,149[11]/728,047 eligible households). Assuming that could grow to a target regional zonal market saturation of 85% in just 14 years appears optimistic.

[9] The purchase funnel, is a marketing model which illustrates the theoretical customer journey from product awareness to the eventual point of purchase

[10] As of the date of this study ILLUME was provided a list of key strategic supply side partners and that list only included one retailer contact – indicating that more effort needs to be made in increasing the number of strategic partnerships with retailers.

[11] Includes cooling-only applications

2. INTRODUCTION

2.1 PROJECT OVERVIEW

This report presents the findings from the fourth Market Progress Evaluation Report (MPER) of the Northwest Energy Efficiency Alliance's (NEEA's) NW Ductless Heat Pump Project (Initiative). NEEA is supported by and works in collaboration with the Bonneville Power Administration, Energy Trust of Oregon and more than 140 Northwest utilities on behalf of more than 13 million energy consumers. NEEA uses the market power of the region to accelerate the innovation and adoption of energy-efficient products, services and practices.

NEEA launched the DHP Initiative in 2008 as a pilot that set out to demonstrate that DHP's were a viable technology to displace electric resistance heat in existing homes. The full Initiative launched in 2010. The Initiative installed 7,688 DHP's in Northwest homes during 2013 and 8,701 during 2014, with over 36,000 installed since the launch in 2008. CLEAResult[12] is the Program Management Contractor (PMC) delivering the Initiative under NEEA's direction. More information on the Initiative can be found at www.goingductless.com.

The Initiative is a market transformation effort that leverages upstream activity to promote product availability and to build consumer and market awareness. While primarily driven by the midstream and upstream market, the program includes a consumer-focused marketing strategy designed to create demand (or "pull") from the consumer. As part of this effort, the Initiative developed an updated Marketing Strategic Plan in 2014 that described specific tactics for addressing the multiple challenges and barriers still faced by the technology in the market. Broadly, the barriers include:

1. Slow consumer progress from the awareness stage to purchase, also referred to as purchase funnel[13]
2. High total cost
3. Weak DHP marketing and training throughout the supply chain. Supply-chain lack of acceptance of 1:1 displacement approach

In addition to updating the marketing strategy, NEEA implemented a few additional changes to the Initiative in 2014, which included:

1. Clarifying target markets
2. Updating the Logic Model
3. Modifying a number of the Market Progress Indicators (MPIs) used to define Initiative success

The Initiative also undertook efforts to increase the availability of DHPs in the marketplace. For example, the Initiative engaged in more partnerships with retailers, began exploring expanded

[12] Fluid Market Strategies, who was the PMC in the prior reporting, was acquired by CLEAResult in 2011.

[13] The purchase funnel is a marketing model which illustrates the theoretical customer journey from product awareness to the eventual point of purchase.

financing options for customers, and more actively engaged real estate professionals beyond the metropolitan markets.

2.2 INITIATIVE GOALS AND LOGIC MODEL

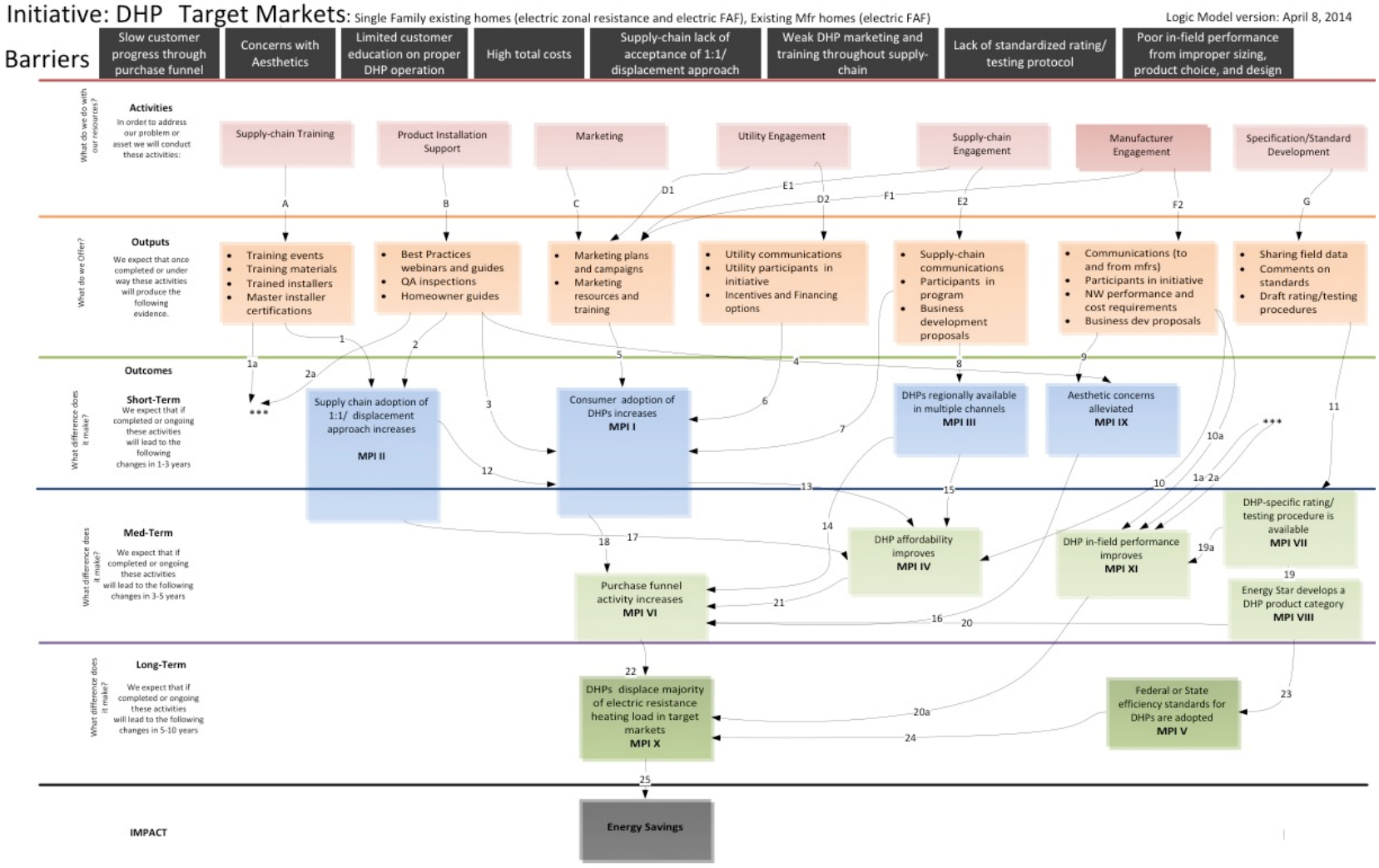
The program logic model is a means to visually capture the program theory and activities, outputs, and outcomes that will lead to the achievement of Initiative objectives. In 2014, NEEA revised the program logic model. Key changes include:

- Updating the documentation package (theories and assumptions tables)
- Updating barriers
- Adding "Manufacturer engagement" as an Activity area
- Rewriting Outputs to more specifically identify Initiative outputs
- Adding explicit incorporation of MPIs into Outcomes

ILLUME completed a review of this updated NEEA Logic Model (dated April 8, 2014). This effort included a review of a memo drafted by NEEA outlining DHP Initiative changes and all logic model documentation. ILLUME also had discussions with key NEEA staff which informed the logic model review. ILLUME reviewed the document for clear and logical associations between program activities and outcomes and that the outcomes were reasonable and could be measured through the Market Progress Indicators.

ILLUME concluded that the newly revised logic model is well thought out and captures the range of actions NEEA can take within its program scope as well as the key objectives of NEEA's DHP Initiative. Specifically, the current logic model sufficiently captures the barriers, includes current program activities, and concretely defines associated outcomes. No updates were made to this 2014 version, illustrated in Figure 1. The full logic model review memo can be found in Appendix B.

Figure 1: Ductless Heat Pump Initiative Logic Model



3. EVALUATION METHODOLOGY

This is the fourth MPER completed since the official initiative launch in 2010. To allow for comparability across years, and identify market and Initiative changes, ILLUME completed similar activities as those conducted in the prior study, while increasing the number of representative groups (referred to as stratification below), and sample sizes for the installer surveys for additional analysis. This section describes study activities and methods.

3.1 MARKET PROGRESS

A primary objective of this study was to characterize and document the market progress. This characterization focused on installer activities and supply-side infrastructure and reviewed: 1) number of DHP installations in the region; 2) level of installer participation, overall and by Master Installer, and; 3) changes in the market for DHPs since the completion of the last MPER. ILLUME completed this analysis using program tracking data provided by CLEAResult and via supply side surveys and interviews. Note that this study did not update the residential housing stock characterization that was part of the third MPER[14]; as housing stock is not likely to change significantly over the course of a few years and this activity was not included in the year's scope.

3.2 EMAIL AND TELEPHONE SURVEYS

ILLUME conducted quantitative online and telephone surveys of Initiative participants and installers engaged in the Initiative. The primary goal of the surveys was to evaluate the current status of the DHP market in the Northwest. All quantitative surveys were sampled to achieve a minimum 90% ±10% confidence level at the program levels.

Program participant surveys: ILLUME completed a quantitative survey of 200 households that received rebates through their utility for installing DHPs between July 1, 2013 and December 31, 2014. The survey, completed in February-March 2015, gathered insight into the decision-making process, DHP usage and maintenance, and satisfaction. ILLUME randomly sampled households within three state-level groups: Idaho/Montana, Oregon, and Washington. Idaho and Montana were combined and oversampled due to the relatively low populations within those states. Climate zones were also retained for additional analysis. ILLUME weighted the analysis to account for disproportionate sampling and response by state.

General population surveys: ILLUME also leveraged the recent research completed for NEEA on DHP message testing[15] to provide additional insight into the general population (non-DHP) perspective including awareness, barriers to technology adoption, and interest in purchasing DHPs.

Installer surveys: ILLUME conducted a quantitative survey with 203 participating installers. The installer survey, which was completed in March 2015, collected information on experience

[14] Evergreen Economics. 2014. Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3.
[15] ILLUME Advising. 2014. Consumer Messaging for Ductless Heat Pumps and Heat Pump Water Heaters.

with DHPs, marketing practices, consumer awareness and perceptions, and installer awareness of and interactions with the Initiative. Using the tracking data provided by CLEAResult, ILLUME organized and randomly sampled installers by state (Idaho/Montana, Oregon, and Washington) and installer type (Master Installers and other installers[16]). Forty-six Master Installers, and 157 other installers, were surveyed. Idaho and Montana installers were oversampled due to the relatively small populations within those states. ILLUME weighted the analysis by state and installer type to account for this disproportionate sampling and response.

3.3 IN-DEPTH INTERVIEWS

A series of in-depth interviews were conducted with 21 staff from Northwest utilities and sponsors involved in the Initiative, four distributors, one retailer, and one manufactured home retailer. The interviews focused on program design, messaging approach, challenges and barriers, the future of the DHP market, and suggestions for improving the Initiative.

3.4 NON-INCENTED DHP SAVINGS ASSESSMENT AND ACE MODEL REVIEW

NEEA's Alliance Cost Effectiveness (ACE) model uses information related to non-incented DHPs to estimate energy savings. This analysis, which was completed for the prior two studies, characterizes the market for non-incented installations of DHPs using data gathered through the installer surveys. For comparability to the last study's results, ILLUME mirrored the non-incented savings approach used in the 2013 MPER as documented in Appendix C.

ILLUME reviewed the ACE model to assess the model's assumptions, market modeling for Market Size for Homes with Forced Air Furnaces, and application of the DHP installation by housing type data from the non-incented savings analysis completed in the 2013 MPER. The review also assessed the reasonableness of the goal to reach 85% market saturation by 2029 within existing, single-family homes with zonal heating systems. Appendix D presents the findings of this review.

4. MARKET CHARACTERIZATION

4.1 TARGET MARKET AND INITIATIVE ACHIEVEMENTS

As shown in Table 1, utilities participating in the Initiative installed just over 8,700 units in 2014. This number marks a significant increase over 2012 at 5,289 and 2013 at 7,688. The majority of 2014 installations were in Washington (59%) and Oregon (36%). Not surprisingly, Washington and Oregon also have the highest concentrations of single-family electrically heated homes[17].

[16] Other installers have not completed the training required to meet the Master Installer criteria.

[17] ILLUME did not revise the distribution of existing, detached owner-occupied single-family homes in the Northwest by cooling zone and urban/rural classification as this would not have changed significantly since the last MPER completed in 2013. A table showing this distribution is available in Appendix E.

Table 1. Incented DHP Installations by State and Year

State	2012 Number of Installed DHP's	2012 Percent of Installed DHPs	2013 Number of Installed DHP's	2013 Percent of Installed DHPs	2014 Number of Installed DHP's	2014 Percent of Installed DHPs
Idaho	177	4%	311	4%	291	3%
Montana	225	4%	210	3%	164	2%
Oregon	2,069	39%	2,626	34%	3,113	36%
Washington	2,818	53%	4,541	59%	5,133	59%
Total	5,289	100%	7,688	100%	8,701	100%

Notes: Source: 2013 and 2014 - Incentive totals provided by CLEAResult; 2012 - Table 2 of Market Progress Evaluation Report #3[18]

Annual installation and incentive counts are available at the state level; however, detailed installation data is only available for the 28 utilities for which CLEAResult processes rebate applications. Table 2 provides a breakdown of participation by EPA climate zone[19] for the utilities included in the detailed installation data.

Table 2. DHP Program Participation by Climate Zone

Climate Zone	2014 Number of Installed DHP's	2014 Percent of Installed DHPs
Zone 4	2,311	83%
Zone 5	359	13%
Zone 6	110	4%
Total	2,780	100%

Notes: Source: Initiative database provided by CLEAResult February 2015[20].

As shown in Table 3, DHP sales, especially non-incented sales, have continued to climb each year since 2011.

[18] Evergreen Economics. 2014. Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3.
[19] http://www.epa.gov/indoorairplus/pdfs/climate_zones_map.pdf
[20] Initiative database contains data for the 28 utilities for which CLEAResult processes rebate applications.

Table 3. Incented and Non-Incented DHP Sales by Year

	2011	2012	2013	2014	Total
Incented Heating and Cooling	4,893	5,289	7,688	8,701	26,571
Non-Incented Heating and Cooling	6,280	8,835	8,175	14,091	37,381
Non-Incented Cooling Only	1,367	1,909	2,089	2,098	7,463
Total Outdoor Unit Sales	12,540	16,033	17,952	24,890	71,415

Notes: Source: DHP sales totals provided by CLEAResult**.**

4.2 SUPPLY SIDE CHARACTERISTICS

In addition to the many manufacturing and distribution companies participating in the Initiative, the Initiative currently has strategic relationships with the manufacturers and distributors listed below in Table 4.

Table 4. DHP Manufacturing and Distribution Companies Involved with Initiative

Manufacturing Companies
Daikin AC
Fujitsu General America
Lennox
Mitsubishi Electric
Toshiba Carrier
Distribution Companies
Gensco
Johnstone (Popma)
Johnstone (Sadlier)
MarHy
Thermal Supply

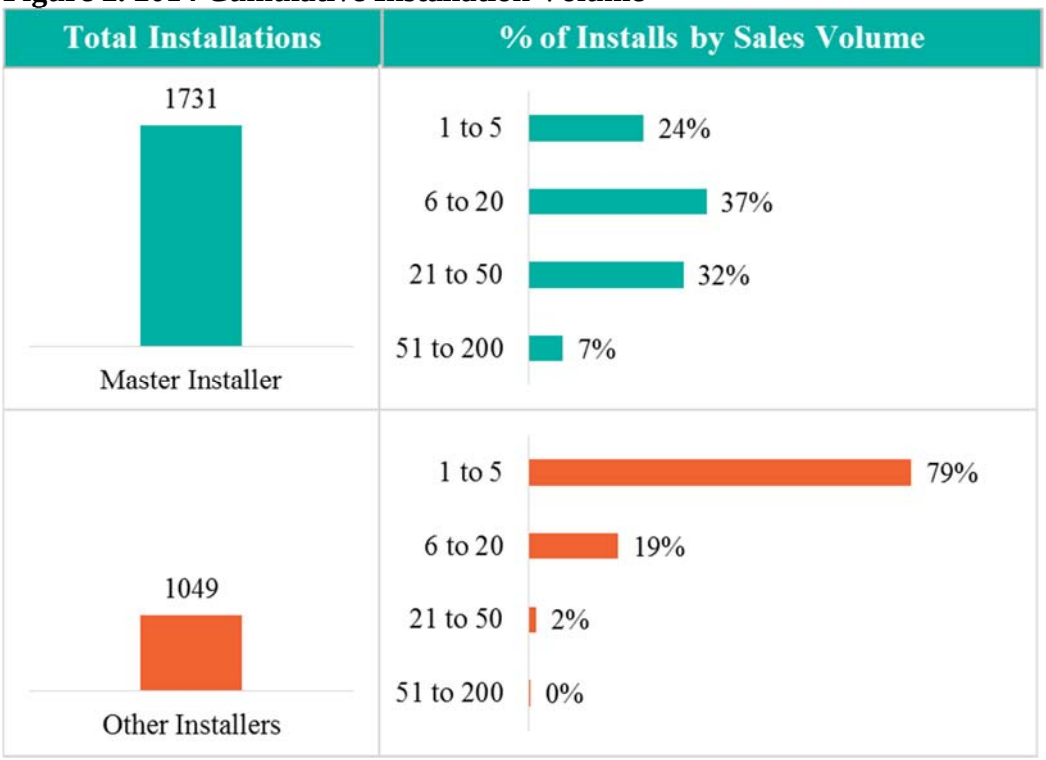
Notes: Source: CLEAResult. This list includes those manufacturers and distributors with a strategic relationship with the Initiative, not all involved.

Mitsubishi is the most popular DHP brand among applications processed by CLEAResult in 2014; however, Daikin has continued to increase its market share (from 13% in 2011[21] to 40% in 2014). Meanwhile, Mitsubishi's market share has fallen from 50% in 2011 to 45% in 2014.

Based on the detailed program data available from CLEAResult, 336 different installers, 84 Master Installers and 252 other installers participated in the Initiative during 2014. Notably, not one installer made up more than five percent of total installations. As shown in Figure 2 below, 61% of Master Installers and almost all (98%) of other installers have performed between one and 20 DHP installations with most of them (79%) installing five or fewer DHPs. In total, the program has trained 125 Master Installers; up from over 100 in 2012.

[21] Evergreen Economics. 2014. Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3.

Figure 2. 2014 Cumulative Installation Volume



Notes: Source: Initiative database provided by CLEAResult February 2015[22].

There are currently 102 utilities participating in the Initiative. Pacific Power, PGE, Clark Co. PUD, and Seattle City Light account for nearly 70% of the installations for which CLEAResult processed applications. Installation costs ranged from about $1,000 to over $20,000 and roughly two-thirds of these installations were 1:1 installations. The incentives currently offered by the participating utilities range from $500 to $1,500 depending on the utility and the type of installation.

5. FINDINGS

5.1 PARTICIPANT & GENERAL POPULATION SURVEYS

As described above, ILLUME surveyed 200 households that installed and received an incentive for a DHP between July 1, 2013 and December 31, 2014 through the Initiative. The survey, gathered insight into the decision-making process, DHP usage and maintenance, and satisfaction.

ILLUME also leveraged the recent research completed for NEEA on DHP message testing[23] to provide additional insight into the general population (non-DHP) perspective. A total of 282

[22] Initiative database contains data for the 28 utilities for which CLEAResult processes rebate applications
[23] ILLUME Advising. 2014. Consumer Messaging for Ductless Heat Pumps and Heat Pump Water Heaters.

single-family homeowners who had an electric-heating system that was at least ten years old completed surveys during November of 2014.

5.2 INITIATIVE PARTICIPANT RESULTS

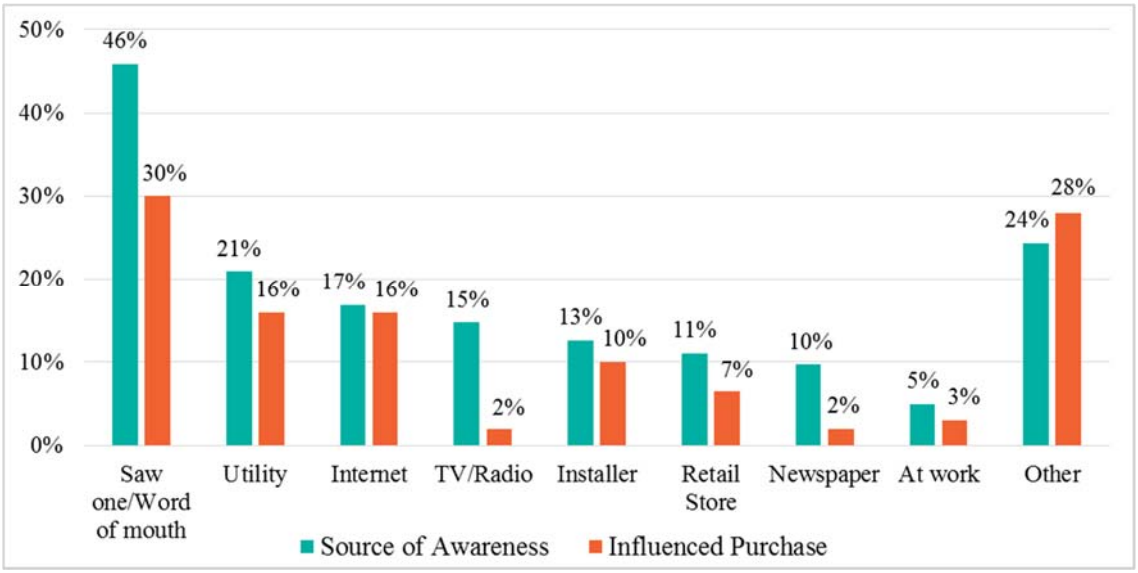
Word of mouth and seeing a DHP in use is the most common way participants became aware of DHPs. The next most common sources of awareness were utility sources (21%), internet research (17%), and TV or radio (15%).

The survey also assessed what the primary source of influence was impacting the purchase decision. Again, word of mouth was most important (30%), followed by utility sources (16%) and internet research (16%).

Interestingly, only a small percentage of customers (10%) noted that their installers were important in their decision to install a DHP. This is down from the most recent MPER where 15% named an installer as influential in their purchasing decision. Conversely, word of mouth and internet were named far more frequently than in the prior study (46% and 17%, respectively)[24]. It is unclear what is driving these differences, although the results could indicate increased general awareness or more educated consumers, and / or reflects the increased prevalence and influence of online ratings and reviews in this increasingly digital world.

[24] Differences are statistically significant at the 95% confidence level.

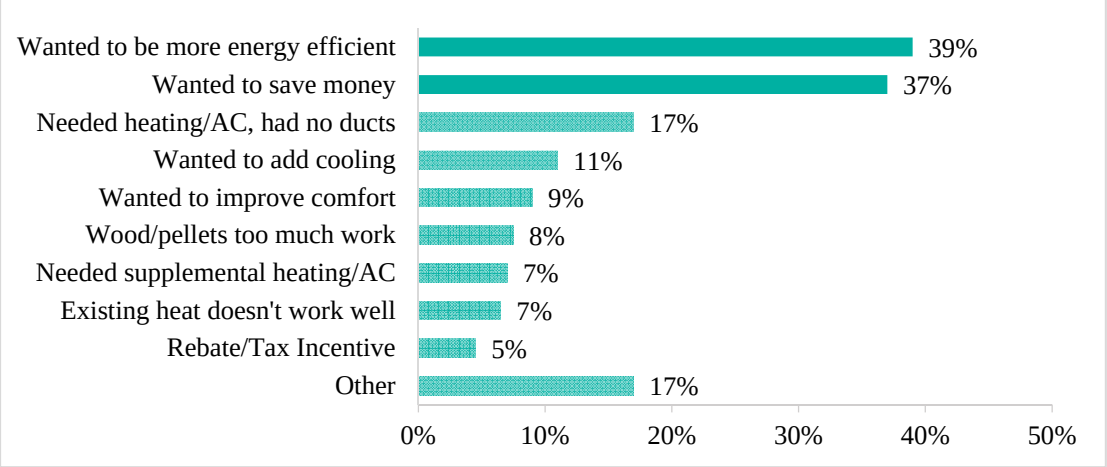
Figure 3. Participants' Source of DHP Awareness and Factors that Influenced Purchase



Notes: Q3. How did you first hear about ductless heat pumps?
Q4. Did you hear about it anywhere else? Multiple responses allowed.
Base: All respondents, n = 200.
Q8. Which information sources, including the one(s) you just mentioned, were especially important in your decision to install the ductless heat pump? Multiple responses allowed.
Base: All respondents, n = 200.

As shown in Figure 4, the desire to save energy and money are the top two reasons participants in the Initiative become interested in DHPs. Thirty-nine and 38%, respectively, mentioned each of these as the reason they became interested in the technology. Notably, in the last MPER 51% and 16% noted desire to save energy and saving on energy bills as their reason for interest in DHPs respectively, indicating a drop in the value of saving energy and an increase in the value of saving money. The need for heating or cooling that doesn't require ducts was the next most common reason for interest in DHPs at 17%.

Figure 4. Participants' Initial Reasons for Interest in DHPs



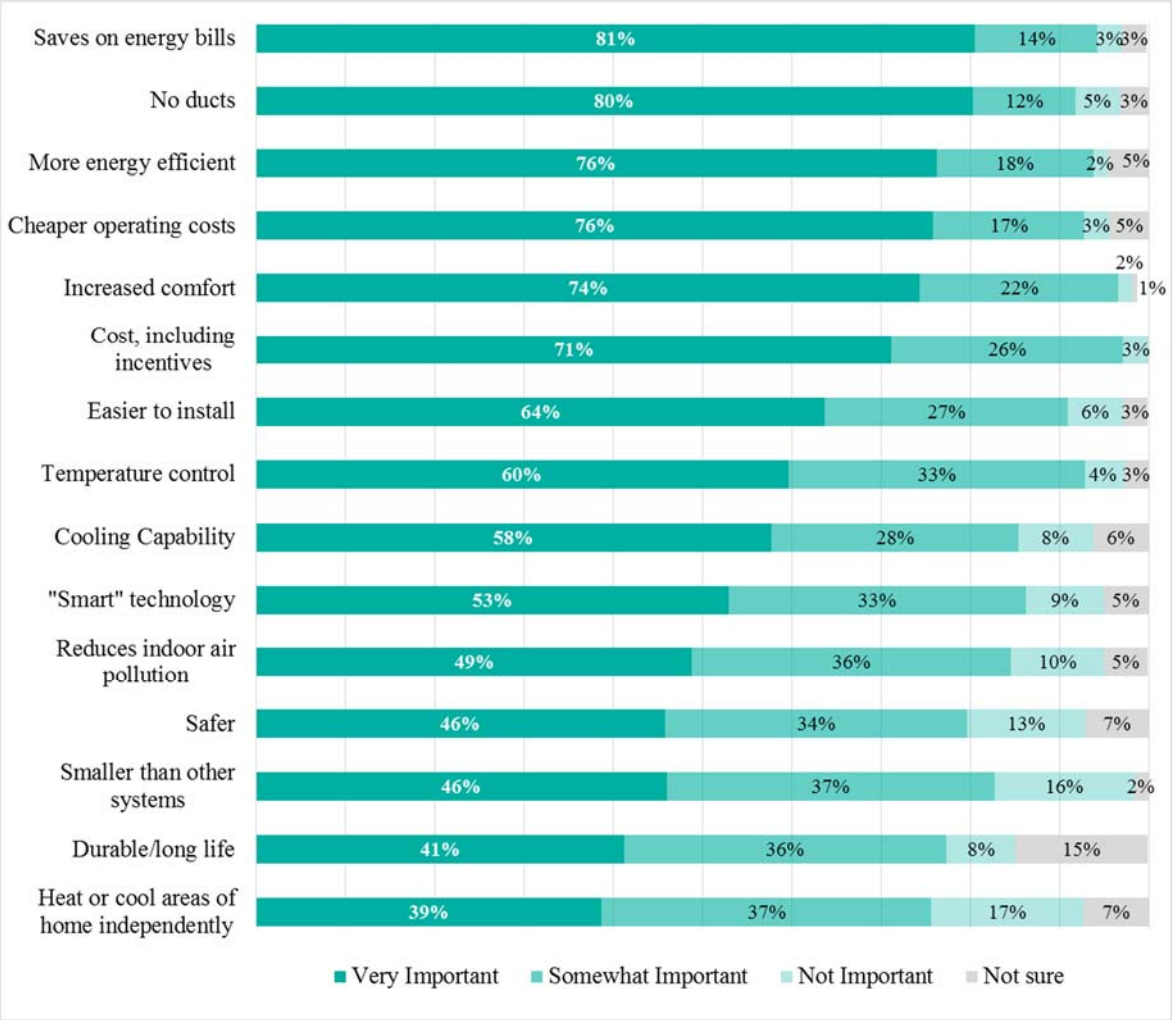
Notes: Q32. What initially interested you in the ductless heat pump? Multiple responses allowed.
Base: All respondents, n=200.

Wood (35%), wall heaters (30%), and baseboards (23%) are the most common heating sources used prior to installing a DHP. Eighty-six percent now use their DHP as their primary heating source.

Prior to the DHP installation, approximately one-third of the participants had cooling equipment in their homes. Window air conditioners were the most popular at 23% followed by portable air conditioners at seven percent.

Figure 5 depicts the importance of different DHP benefits to participants. A number of benefits are very important to the participants. Saving on energy bills, the ability to heat without ducts, energy efficiency, cheaper operating costs, increased comfort, and overall cost all received over 70% rating each as "Very important."

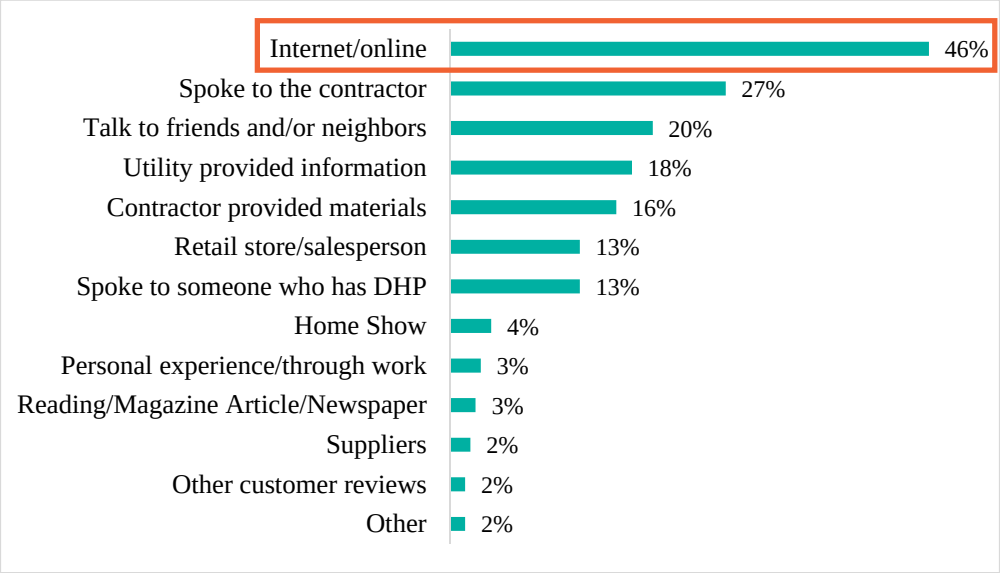
Figure 5. Importance of DHP Benefits in Purchase of DHP



Notes: Q33. Please rate how important each of the following factors was in your decision to purchase a ductless heat pump, were 1 is not at all important, and 5 is very important. Base: All respondents, n = 200
"Very important" and "Not important" based on top 3 and bottom 3 scale options. "Somewhat important" based on the middle 4 scale options. Some categories do not sum to 100% due to rounding.

Participants turned to a variety of different information sources when seeking information on DHPs prior to installation. A dozen different sources were mentioned by three or more participants. Initiative participants went to the Internet most frequently at 46%. Speaking to an installer, or friends and neighbors are the next most frequently cited information sources at 27% and 20%, respectively. Figure 6 provides more details on the information sources used by participants.

Figure 6. Participant Information Sources



Notes: Q35. How did you gather information about the ductless heat pump before you made your purchase?
Base: All respondents, n = 200. Multiple response.

In considering a DHP, a large portion (44%) had no concerns about purchasing the equipment. The top concerns for participants were general capability and functionality (14%) and the cost (12%). However, very few of these concerns remained after the installation.

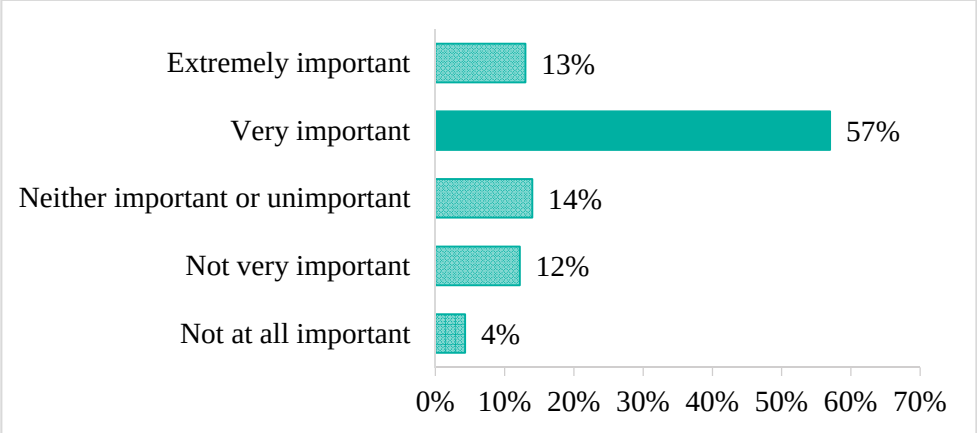
Table 5. Participant Concerns Regarding DHPs

	Concern Prior to Install	Concern After Install
No Concerns	**44%**	**0%**
Capability/functionality - general	14%	4%
Cost/expense	12%	n/a
Appearance	10%	3%
Capability/functionality - cold weather	4%	3%
Noise	3%	0%
Challenge to install yourself	2%	0%
Maintenance needs	2%	0%
Are an unfamiliar technology	1%	0%
Improperly installed equipment may waste energy	1%	0%
Are not offered by every installer	1%	0%
Other	12%	3%

Notes: Q36. Was there anything you were concerned about when you were considering a ductless heat pump?
Q37. Now that you have it installed, is [Q36 ANSWER] a problem?
Base: All respondents, n = 200. Multiple responses allowed for Q36.

The availability of a rebate is important in the decision to purchase a DHP. As shown below in Figure 7, the majority of participants (57%) stated that the rebate was "Very important" and another 12% considered it extremely important. A little over half (55%) of the respondents received rebates between $500 and $1,000, about one-quarter received rebates of over $1,000, 13% received rebates under $500, and the remaining participants could not recall or refused to share the amount of their rebate.

Figure 7. Importance of Rebates in Participants' Purchase Decisions



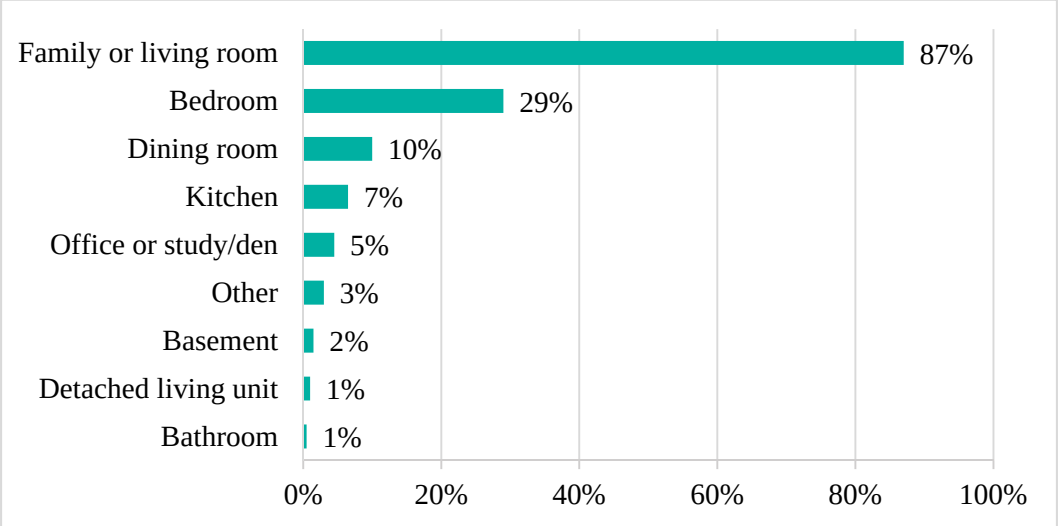
Notes: Q40. How important was the rebate you received to your decision to purchase the ductless heat pump? Would you say it was: Extremely important, very important, neither important or unimportant, not very important or not at all important.
Base: Respondents that knew rebate amount, n=188.

Compared to the previous MPER, more participants used loans to finance their DHP. This number is up from 15% to 26%. Thirteen percent of respondents financed through a local bank or credit union, seven percent through a utility, three percent through the installer and four percent through another source.

When asked where the idea to install a DHP came from, the majority (89%) of participants said it came from someone within the household, while five percent said it was their installer's idea. Almost half (45%) of participants obtained cost estimates from just one installer, with the balance received estimates from multiple installers. Trust (23%) and lowest cost (21%) were the most frequently cited reasons for choosing an installer. Customers also valued the company reputation and presentation and customer service, with 14% of participants citing each of these as reasons for choosing their installer.

As depicted in Figure 8, nearly all (87%) participants installed a DHP in their living or family room. Bedrooms were the second most popular installation location with 29% of respondents installing one there.

Figure 8. Location of Participants' DHP Installations



Notes: Q52_2. In which room in your house is that/each of those unit(s) installed? (Check all that apply)
Base: All respondents, n = 200.
Respondents who cited both family and living room are counted only once.

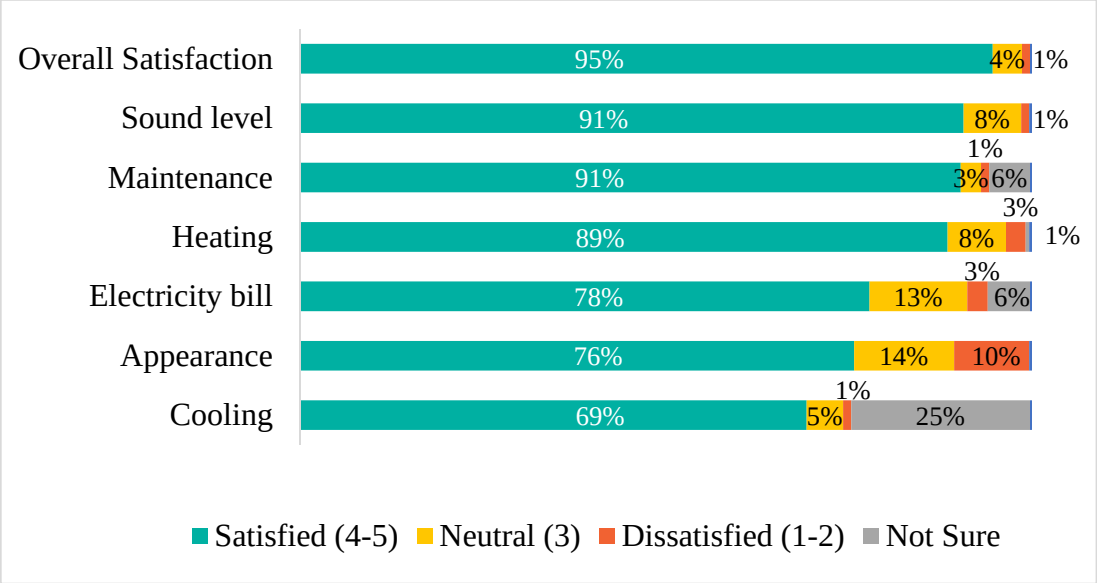
Three-quarters of participants are using their DHPs for both heating and cooling, one uses it for cooling only, and the remaining homeowners are using it for heating only. Overall, 70% of participants responded that the DHP has always been able to meet their heating and/or cooling needs. Only 26% of participants stated that their DHP had been unable to meet their heating needs at times. The balance stated it was unable to meet both heating and cooling needs or cooling only needs at times.

Participants were asked where they received information on the lowest outdoor temperature at which the DHP would perform well. The largest percentage of customers (20%) reported that they received this information from a conversation with their installer. Another 17% reported that this information came from the manufacturer through product literature or the owner's manual. The coldest temperatures at which participants expected their DHP to perform ranged from -32 degrees Fahrenheit to 40 degrees Fahrenheit, with 66% reporting less than 30 degrees.

Just over 75% of participants manually adjust the temperature settings and 20% have programmed their temperature settings. A little over half (57%) of the participants who have programmed their DHP are setting it as the primary heating or cooling source in order to maximize energy savings.

Overall, participants are very happy with their DHPs. Ninety-five percent gave their overall satisfaction a rating of "satisfied" (4) or "very satisfied" (5) and only one percent gave it a rating of "dissatisfied" (2) or "very dissatisfied" (1). Fewer households reported being satisfied with cooling than the other categories, although a quarter also responded "don't know" to this question, indicating they may not have used the DHP for cooling at the time of the survey.

Figure 9. Participant Satisfaction with DHP

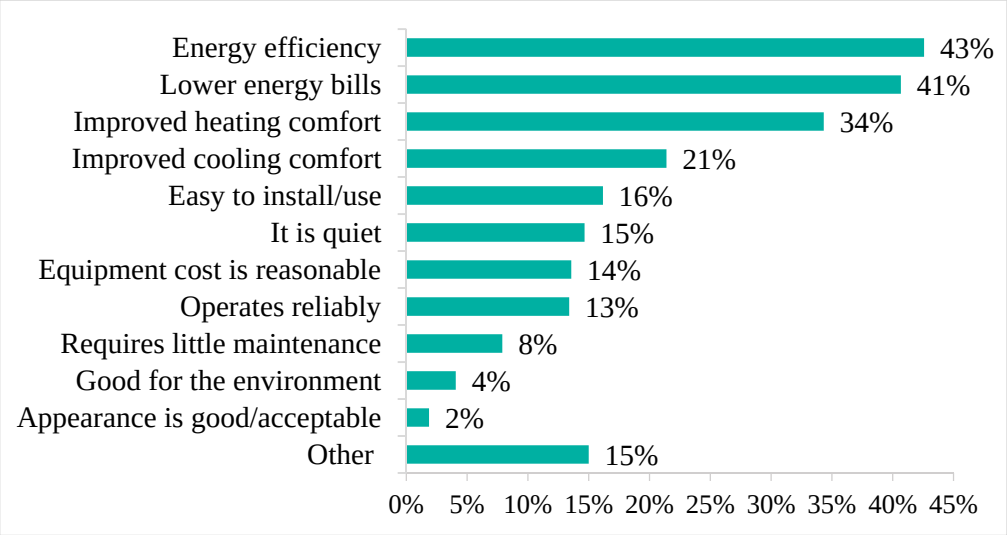


Notes: Q66. Please rate your satisfaction with the following aspects on a 5-point scale, where 1 means "very dissatisfied" and 5 means "very satisfied": A. the sound level of the indoor unit, B. your electricity bill since installing the ductless heat pump, C. the heating, D. the cooling, E. the maintenance required, F. the appearance of the indoor unit, G. And what is your overall satisfaction rating?
Base: All respondents, n=200.

Aesthetics does not appear to be a concern for households. As shown previously in Table 5, only 10% cited the appearance of the DHP as a concern prior to installation and that concern remained for only 3% after installation. Furthermore, almost 60% said they no longer even notice the DHP unit on their wall. Thirty-seven percent of those participants stated it took less than a month for them to stop noticing the unit, 44% stated it took between one and six months, and 12% stated it took six months or more to stop noticing the unit.

Further evidence of customer satisfaction with their DHPs is provided in their likeliness to recommend the technology. Out of all the participants, only two would not recommend a DHP to a friend, colleague or family member. Seventy-nine percent have already recommended a DHP and 19% say they would recommend a DHP in the future. The top reasons for recommending DHPs were energy efficiency (43%), lower energy bills (41%), and improved heating comfort (34%). Figure 10 shows additional reasons participants recommended DHPs.

Figure 10. Reasons Why Participants Recommend DHPs



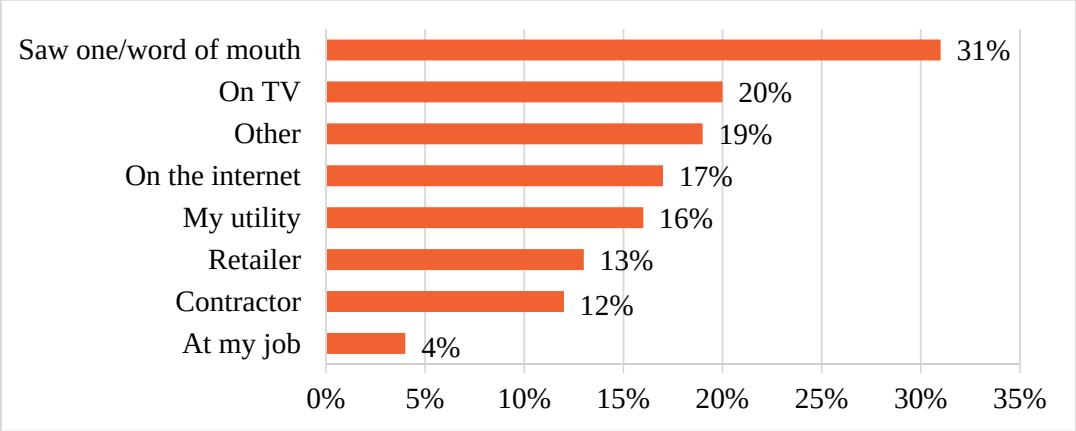
Notes: Q71. What are some of the reasons you recommended it? Multiple responses allowed.
Base: Respondents that have or would recommend, n= 198.

5.3 GENERAL POPULATION RESULTS (NON-DHP HOUSEHOLDS)

Among the general population, respondents[25] were somewhat aware of the DHP technology. However, their experience with, and knowledge of, the technology is limited. Just over 40% of respondents were aware of DHPs. Of the 125 respondents that stated they were "aware" of the technology, only 18% characterized themselves as "familiar" with DHPs. Hearing of DHPs through word of mouth or seeing them in use is the most common way that the general population (31%) learn of the technology. Twenty percent of the general population heard of DHPs on TV and 17% learned of them on the Internet. Figure 11 shows common ways members of the general population learned of DHPs.

[25] ILLUME Advising. 2014. Consumer Messaging for Ductless Heat Pumps and Heat Pump Water Heaters.

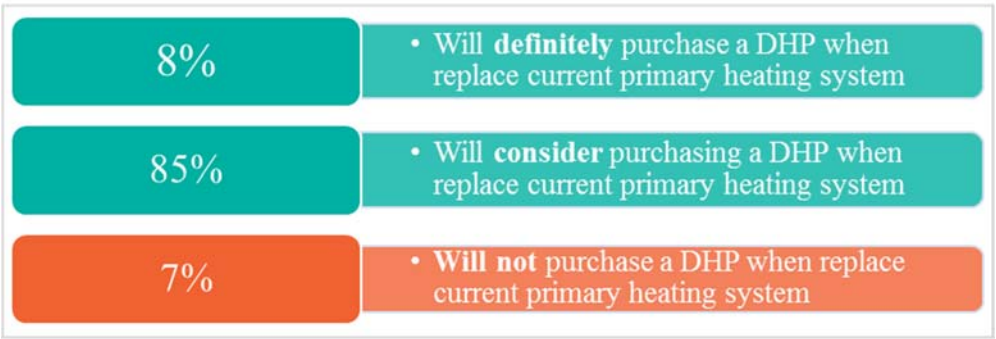
Figure 11. Sources of DHP Awareness among General Population Households



Notes: AWAR3. How did you learn about ductless heat pumps? Multiple responses allowed.
Base: Respondents who have heard of ductless heat pumps, n=125.

As shown in Figure 12 below, most general population households said they will consider a DHP when they replace their existing system. Almost 15% of these respondents anticipate replacing their system in the next two years, 26% plan to replace between two and 10 years. The balance say they either aren't sure when they will replace their current primary heating system or stated it will be at least 10 years.

Figure 12. Likelihood of Purchasing a DHP Among General Population Households



Notes: M5. Based on the information presented today, please tell us which statement best represents your opinion: Base: All respondents, n=281.

General population respondents rated "more energy efficient" and "saves on energy bills" followed by "durability/long life" as very important benefits for a DHP. There are a number of benefits that far more general population households rated as "Very important" compared to the participants. This difference is greatest on the importance of the durability and longer life where 73% of general population households rated as "Very important" compared to only 41% of participants.

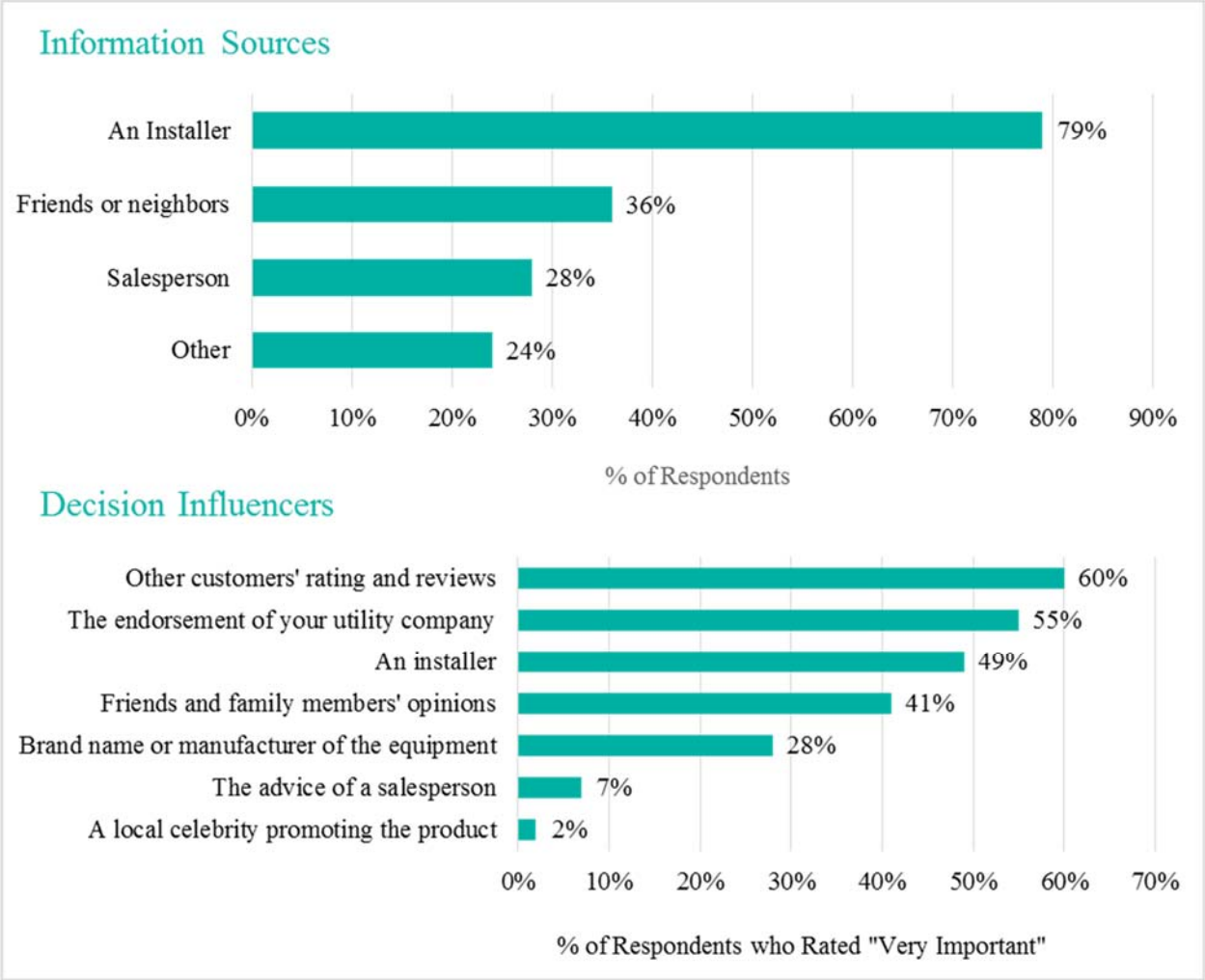
When considering the most motivating messages, after saving money and energy, general population respondents identified "safety" (73%) and "easy to operate" (68%). When

respondents were asked to indicate their motivating features in order of importance, over half of respondents (56%) ranked “save on utility bills” as the most motivating. This was followed by 16% who ranked “energy savings” and 13% who ranked “safety,” as most motivating.

The primary barrier described by general population survey respondents was the upfront cost of purchase. Following that, respondents identified the uncertainty about installation and the long-term lifecycle maintenance costs. Others indicated a need to learn more before they would be comfortable installing a DHP. General population respondents also indicated they wanted detailed information on cost, energy, and install/maintenance costs/needs.

The general population was asked who they would talk to for more information about a new primary heating system, how much influence various sources have on their decision, and where they would begin an internet search to find information related to DHPs. While installers play a prominent role in driving respondents toward specific technologies, “customer ratings and reviews” and the “utility company” have more influence on the actual decision-making process. Nearly half (47%) of participants would start their internet research on DHPs with Google. See Figure 13 for more details on where the general population turns for information on DHPs.

Figure 13. General Population Households' Preferred Information Sources



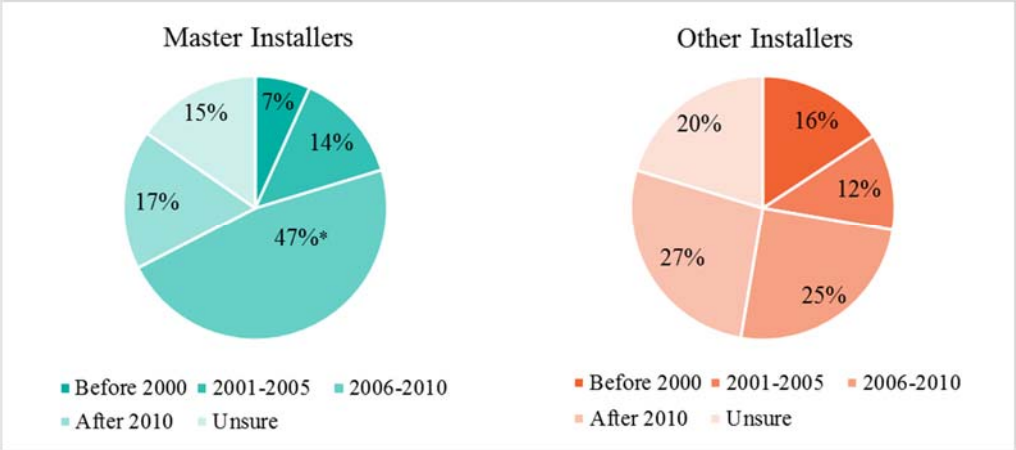
Notes: EQUIP2. When considering a primary heating system purchase, who would you talk to for more information about your product options? (Please check all that apply)? Base: All respondents, n = 282.
EQUIP4. On a scale of 1 to 10, where 1 is not important at all and 10 is very important, how important are the following sources in influencing your decision when considering a new primary heating system? Base: All respondents, n = 279. "Very important" based on top 3 scale options (8, 9, or 10).

5.4 INSTALLER SURVEYS

ILLUME completed 203 online and phone surveys with DHP installers including completing surveys with 46 of the Initiative's Master Installers and 157 other installers.

As shown below in Figure 14, almost half (47%) of the Master Installers installed their first DHP between 2006 and 2010, whereas the largest percentage (27%) of other installers installed their first DHP after 2010.

Figure 14. Year of First DHP Installation

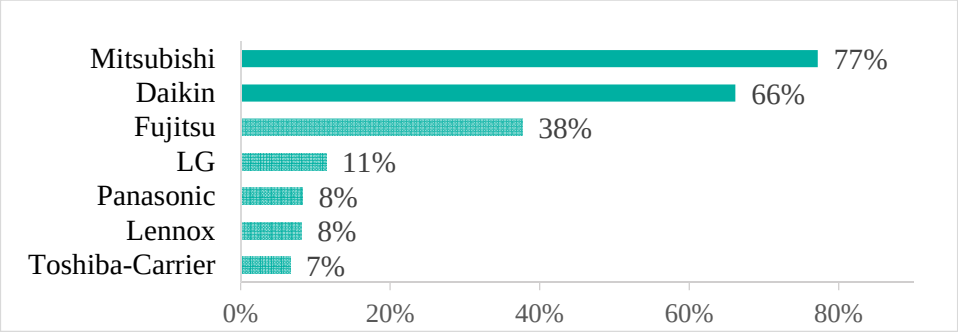


Notes: Q17. In what year did your company install its first residential DHP?
Base: All respondents, Master Installers, n = 46, other installers, n = 157.
*Difference significant at the 95% confidence level.

Newly explored this year is the percentage of revenue and working hours dedicated to DHPs. Master Installers are significantly more invested in selling DHPs than other installers; almost 35% of Master Installers say at least half of their revenue comes from DHPs, compared with only seven percent of other installers. On the other hand, nearly half of other installers said they invest less than 10% of working hours and derive less than 10% of their revenue from DHPs. Overall, 14% of installers say at least half their revenue comes from DHPs. Continuing to monitor this trend will provide evidence of market transformation. Figure 25 in Appendix G provides further detail.

Consistent with the manufacturer market share shown in the Market Characterization (Section 3), installers reported that Mitsubishi and Daikin are the most common DHP brands offered by both Master and other installers. Daikin has become much more prevalent since the previous MPER when only 44% of installers offered the brand, compared to 71% of Master Installers and 65% of other installers currently. Fujitsu has remained steady at around 38%. As shown in Figure 15, fewer than 15% of either installer group offer any of the other DHP brands.

Figure 15. Top DHP Brands Offered



Notes: Q3. Before we go on, let me first tell you that throughout this interview I'll refer to ductless heat pumps as DHPs. Which DHP brands does your firm currently offer to customers? Multiple responses allowed. Base: All respondents, n = 203.

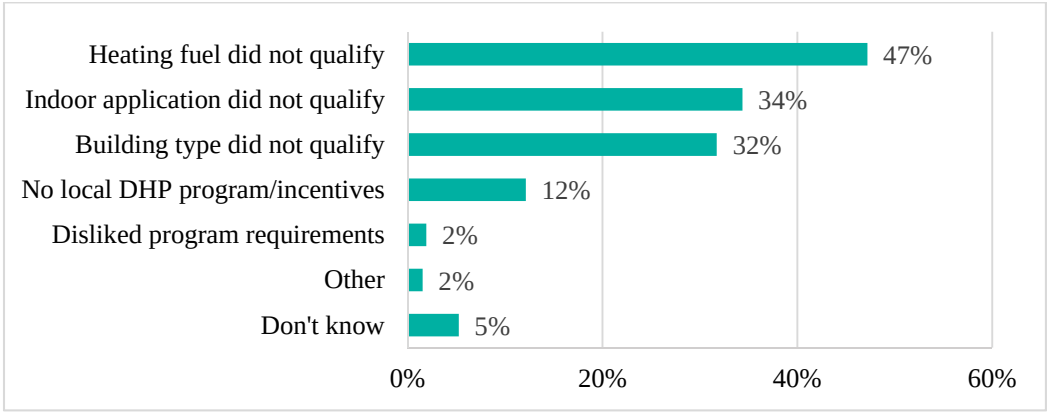
Almost every firm surveyed attended either an installer orientation session or a manufacturer DHP training. Ninety-eight percent of Master Installers and 77% of other installers have attended an Initiative-sponsored installer orientation session. Of the installers that have not had anyone attend an installer orientation session, 38% are very or extremely likely to attend one in the next year and 42% are somewhat likely. All but three installers reported that at least one person has received manufacturer training on DHPs and three-quarters of Master Installers and about two-thirds of other installers plan to send staff to manufacturer training in the next year.

Installation and Sales

The average installation costs reported by Master Installers for a single-headed DHP installation ranged from $2,250 to $5,900. The average costs reported by other installers ranged from $500 to $7,000. While the range between the two groups is broad, the average costs reported between Master Installers and other installers are similar at $4,076 and $3,864, respectively.

Figure 16 displays the reasons why some DHP installations do not receive utility incentives. The most commonly noted reason is that the primary heating fuel did not qualify for the incentive. Note that significantly more Master Installers than other installers cited this as a reason.

Figure 16. Reasons Installations do not Receive Incentive



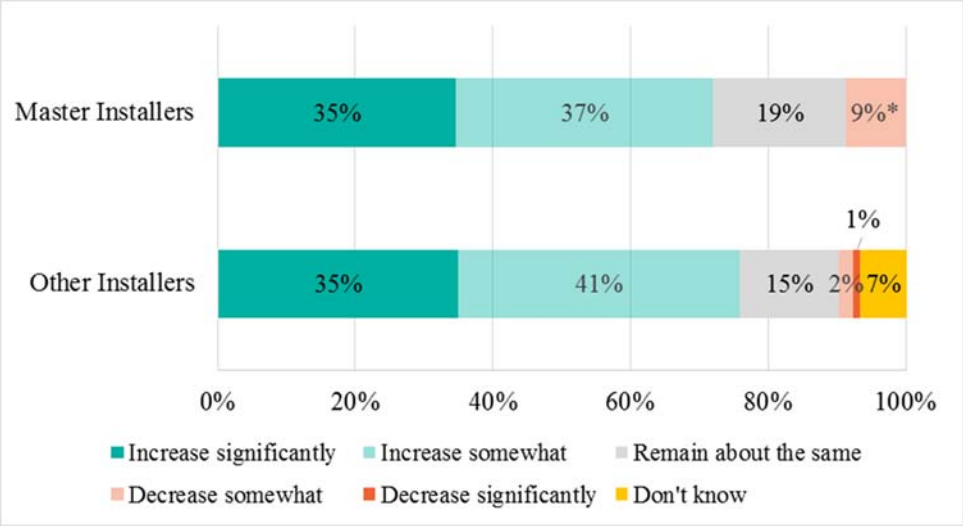
Notes: Q24. Why did some installations not get incentives through a utility? Multiple responses allowed. Base: Installers with installations not receiving utility incentive. n = 153.

Short-run installations continue to be prevalent with 46% of those installers surveyed completing short-run installations. Seventy-two percent of Master Installers report completing these types of installations, compared to only 38% of other installers.

Nineteen percent of the installers reported that they installed at least one cooling-only DHP in 2014. While most of these installers sold only one or two cooling-only DHPs, 44% said this was an increase over previous years.

Slightly over a third of installers expect their DHP sales to increase significantly over the next two years with an additional 40% believing their sales will increase somewhat. There are no statistically significant differences in responses by Master and other installers.

Figure 17. Future Sales Expectations



Notes: Q45. Compared to your 2014 sales of residential DHPs, do you think your sales in the next two years will: Increase significantly? Increase somewhat? Remain about the same as 2014? Decrease somewhat? Decrease significantly?
Base: All respondents, Master Installers, n = 46, other installers, n = 157.

Those that believe sales will continue to increase cited the increased customer knowledge and awareness, increased acceptance and popularity of DHPs, and increased marketing as reasons for their projected increase. The few installers that believe sales will decrease cited market saturation, decreasing or lacking incentives and a poor economy as reasons.

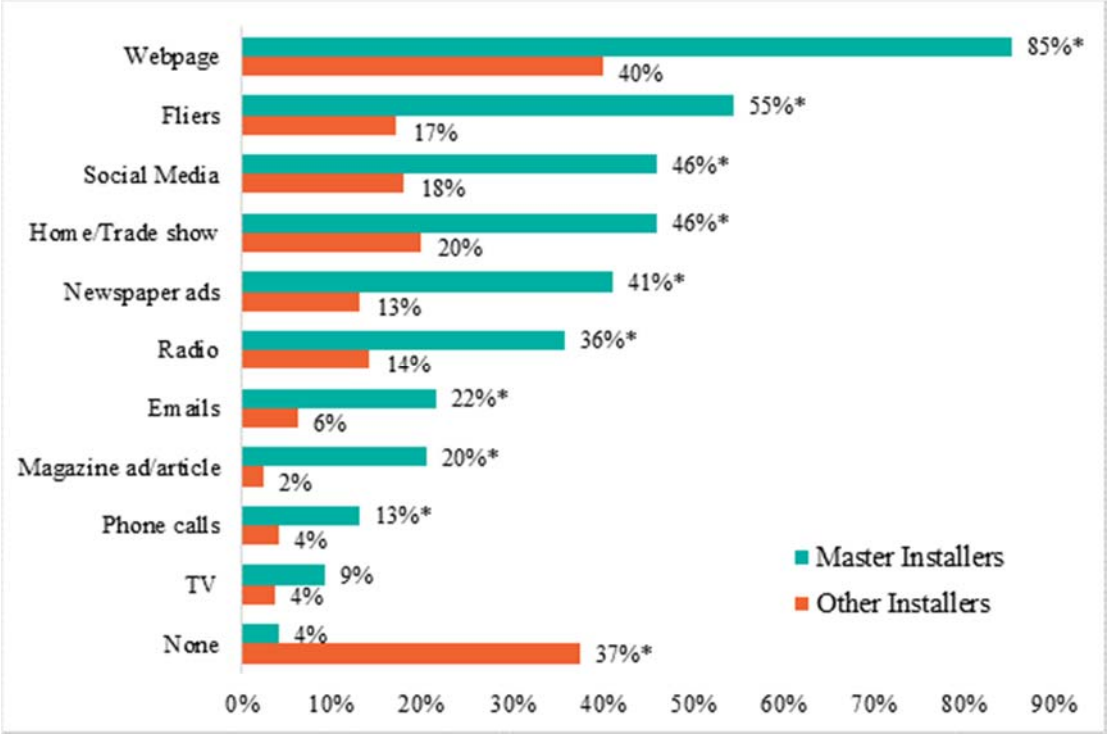
The survey asked installers the types of applications for which they recommended DHPs. The top four most commonly recommended applications are spaces that were previously unheated or additions (95%), homes with zonal electric heat (92%), homes with wood heat (88%), and commercial spaces (84%). These results are consistent with the prior MPER with the exception of the percentage of installers that recommend DHPs for manufactured homes, which increased from 45% to 77%. Just over two-thirds of installers stated that there were situations where they would not recommend DHPs. The situations listed were similar between the two installer groups and include homes that are currently ducted or that can be ducted (22%), homes that are very

compartmentalized or require multiple heads (16%), and homes with existing natural gas, heat pump or radiant heat (eight percent).

Marketing and Raising Awareness

Installers are using a variety of media to market DHPs, most commonly noting their webpage. Interestingly, Master Installers are far more likely to invest in many types of marketing for DHPs than other installers; nearly all Master Installers invest in some sort of marketing of DHPs, compared with 37% of other installers that say they do no marketing (Figure 18).

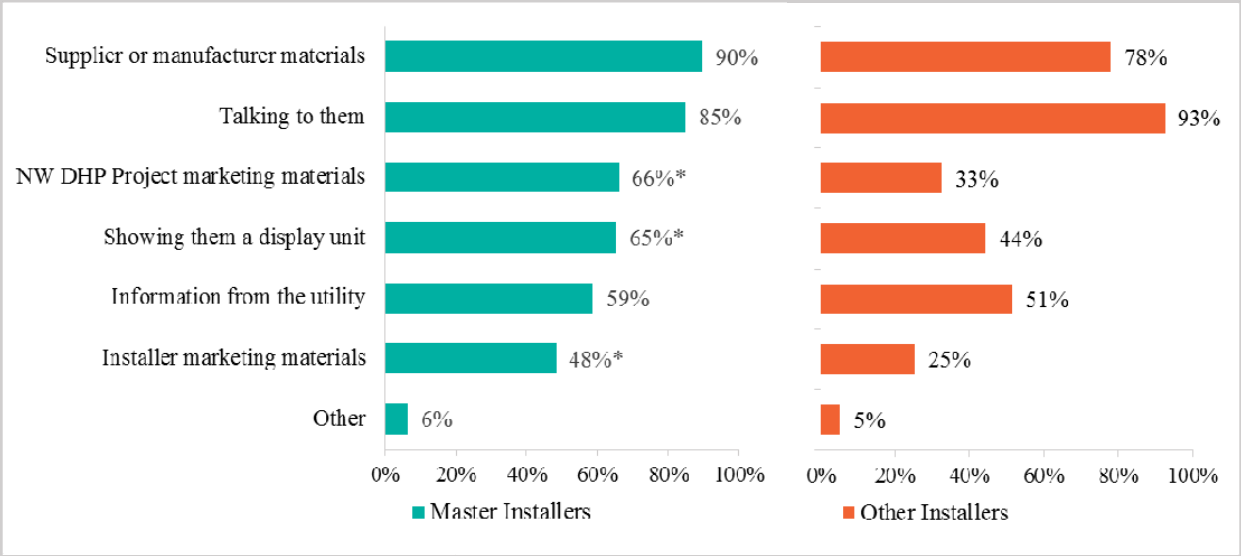
Figure 18. Types of Marketing Media Used by Installers



Notes: Q58. What types of DHP marketing, if any, has your company done? Multiple responses allowed.
Base: All respondents, Master Installers, n = 46, other installers, n = 157.
*Difference significant at the 95% confidence level.

When introducing the technology to customers Master Installers were most likely to use supplier or manufacturer materials (90%), whereas other installers were most likely to simply talk to them. Significantly more Master Installers than other installers use Initiative marketing materials, a display unit, and installer-created marketing materials (Figure 19).

Figure 19. Ways Installers Introduce the DHP Technology



Notes: Q60. When you want to introduce customers who are not familiar with the technology to DHPs, which of the following marketing tools do you use? Multiple responses allowed.
Base: All respondents, Master Installers, n = 46, other installers, n = 157.
*Difference significant at the 95% confidence level.

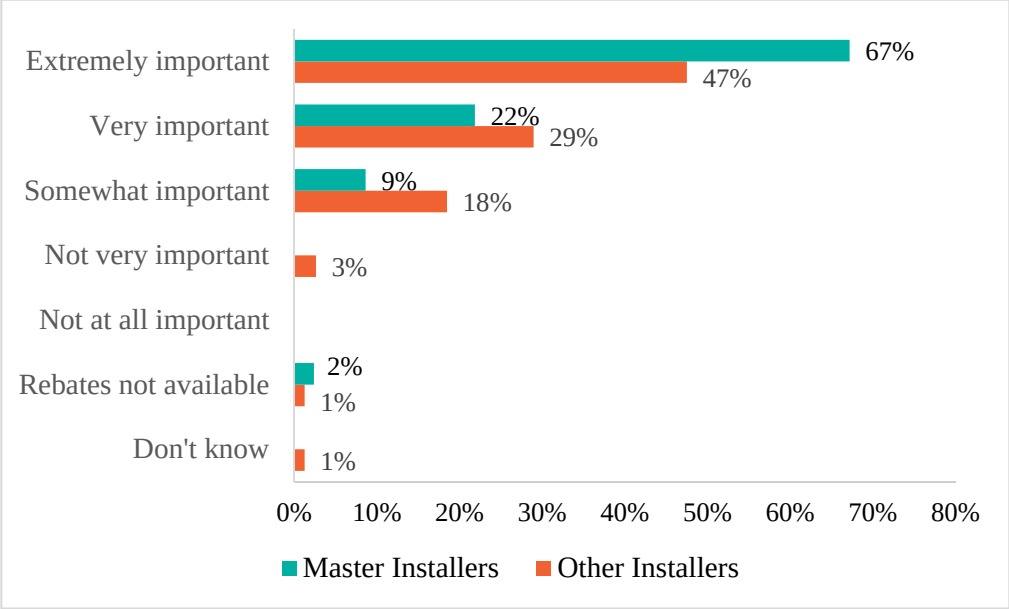
The types of support installers thought would be beneficial didn't differ significantly between the two groups. Over half of all installers stated that additional marketing materials and resources and additional utility support, and 39% stated that additional support from the manufacturers would be helpful.

Seventy-eight percent of Master Installers and 70% of other installers believe that the percentage of customers specifically asking for DHPs was higher in 2014 compared to previous years. On average, installers reported that 52% of customers specifically asked for a DHP, which is an increase from 43% in the previous report.

Installers perceive the installation cost as the biggest barrier to selling DHPs. Installers also noted the equipment appearance as a barrier, both these barriers were also noted in the participating and nonparticipating household surveys.

Not surprisingly, installers rated the utility rebate as extremely important. However, Master Installers were significantly more likely to rate the rebate as extremely important when compared to other installers (67% compared with 47%), as indicated in Figure 20.

Figure 20. Importance of Utility Rebate

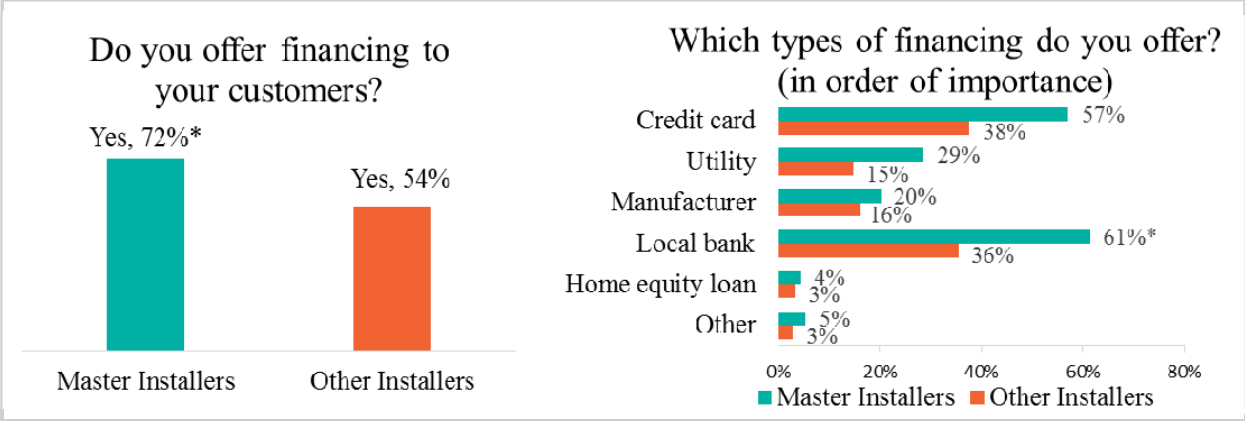


Notes: Q66. How important would you say the utility rebates are to residential DHP sales? Would you say they are:
Base: All installers, Master Installers, n = 46, other installers, n = 157.
*Difference significant at 95% confidence level.

Financing

Approximately 60% of installers offer financing to their customers (Figure 21) with significantly more Master Installers offer financing to their customers than other installers. Installers that offer financing most commonly work through local banks and credit card companies, with credit cards considered the most important financing option. Installers that offer financing estimate that approximately 25% of customers take advantage of the offer.

Figure 21. Financing Options Provided by Installers

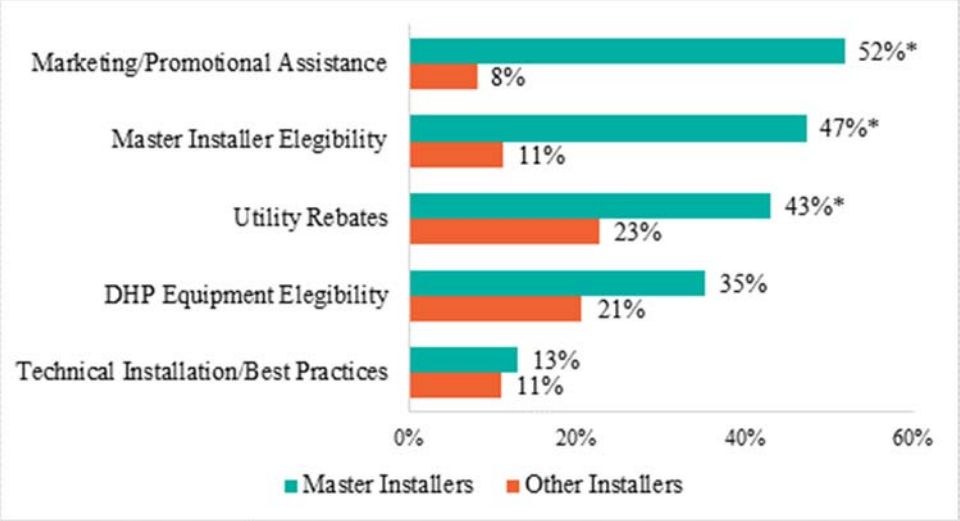


Notes: Q66a. Do you offer financing to your customers?
Base: All installers, Master Installers, n = 46, other installers, n = 157.
*Difference significant at 95% confidence level.
Q66b. What type of financing do you offer for your customers? (Select all that apply)
Base: All installers offering financing, Master Installer n = 33, other installer n = 84.

Initiative Awareness and Interactions

Almost all surveyed installers (96%) are familiar with the Initiative and about half of all installers have contacted program staff. As expected, the percentage of Master Installers that have contacted program staff is significantly higher at 74% compared to only 43% of other installers. As shown in Figure 22, the reasons for contacting program staff vary between the two groups. Master Installers most frequently contacted the program about marketing or promotional assistance and their Master Installer eligibility, whereas other installers most frequently contacted the program about utility rebates and DHP equipment eligibility. Both groups of installers were very satisfied with program staff during these interactions; 94% of Master Installers and 86% of other installers rated the staff as very or extremely responsive.

Figure 22. Reasons for Contacting Program Staff



Notes: Q43. Have you contacted NEEA Ductless Heat Pump program staff?
Q74. Regarding what issues or questions?
Base: Installers who have contacted program staff, Master Installers, n = 34, other installers n = 67.

Ninety-eight percent of Master Installers and 80% of other installers have visited goingductless.com. About 85% of those installers thought the website was somewhat or very useful and another 12% thought that it was extremely useful.

Installers provided positive feedback about the program. Comments that illustrate their satisfaction include:

> *"Our company would not be successful or perhaps even be in business if it wasn't for the NW DHPP. Their impact has been astronomical and is the main reason we have been able to sell DHPs so successfully. Couldn't have done it without them!"*

> *"Great technology that was not being offered in the Northwest in any degree until you promoted it. Thanks. It has changed our business focus and many people are benefitting from the comfort and savings."*

When asked for areas of improvement, one of the more prominent issues was small installers' engagement in the program.

> *"Would like to see it help the smaller contractors who are following the program. Lower volume contractors even if they install perfectly do not seem to get the help that the larger contractors get. We have gone through all of the training and are rated highly by our clients, distributors and inspectors. Would love a little more support to encourage growth in this industry."*

> *"It is bogus to base your star ratings on how many units you sell. I have a small business. Of course I am going to sell less. Just because I sell less, doesn't mean I don't know how to install them properly. Ratings should be based on random inspections to see how well they are installed."*

Several installers commented that they would like to see the program encourage more consistency across utilities, offer cooperative marketing, develop more customer education pieces (including videos and case studies), and to let installers know about the type of data that will be collected in the annual MPER survey in advance so they can track the requested information.

5.5 DHP SUPPLIER INTERVIEWS

The ILLUME team interviewed six supply chain partners in April 2014. The interviews included four DHP distributors, one DHP retailer, and one manufactured home representative. Supplier information was provided by the program implementer and represents those with whom they work most closely[26]. The retailer and distributor representatives stated that they were very familiar with the Initiative and their company's interactions with it but the manufactured home representative was much less familiar with the Initiative.

The goals of the interviews were to assess:

- The number of suppliers in the region that are currently offering DHPs
- The challenges or barriers as well as the key benefits experienced by suppliers in offering DHPs to the market
- The trends in volume and market share of DHP units being moved into the Northwest market
- The usefulness of the Initiative and how it could be improved
- The future of the DHP market

Marketing

Three of the four distributors and the retailer have marketed DHPs toward the residential market in the past year. They are targeting the residential market broadly through a variety of methods including customer outreach at events and home shows, traditional advertising (such as radio,

[26] The contact information was not always up to date. In one case ILLUME staff attempted to contact someone who had sold the business 10 years ago.

TV and direct mail), email and phone campaigns, and promoting local utility incentives and national rebates. Comfort and efficiency are the primary messages, with one distributor using the phrase “customized comfort” to describe the comfort provided. The incentives and lower operating costs are also promoted as well as a quick installation. One of the distributors is promoting multi-headed systems more often than 1:1 because, in their opinion, these systems work better with larger homes. However, the remaining suppliers promote both but focus more on 1:1 systems. Using future studies to explore when and why multiple head versus 1:1 installations are recommended may be of value to the Initiative.

The manufactured homes representative isn’t actively marketing homes with DHPs and does not offer DHP-ready homes, but they do always have a display unit with a DHP in the showroom. When talking to customers about the DHP the main messages they relay are energy efficiency and how well the technology works.

Sales Trends

The retailer and distributors carry between two and 30 different DHP models, with between 50% and 100% of models carried qualifying for utility incentives. The most popular of those models are the Daikin LV Series, which was noted by two suppliers, the Mitsubishi single-zone models, and the Lennox 18000 MSA and 9000/12000/15000 btu 1:1 systems that qualify for incentives. Consistent with analysis presented throughout this report, both suppliers noting Daikin as the most popular model also noted that their market share has increased considerably. Several suppliers’ stocking practices have changed due to tax credits, increases in ductless sales, and market potential.

Four of the six suppliers interviewed said the Initiative has impacted their DHP sales and stocking practices. They believe the Initiative has accelerated market share of DHPs and increased awareness. The two challenges in meeting demand cited include keeping up with efficiency requirements and restocking, though it was also noted that this challenge is not unique to DHPs.

Four of the suppliers specifically noted that DHPs constitute a strong market for them. One respondent stated that while they are continuing to advance, DHPs are not a big portion of sales. The manufactured homes representative thought about 15% of homes sold had DHPs installed. When asked if there were any new or growing segments for DHPs, manufactured homes, retrofits, and new construction were each mentioned by one supplier. They also noted that mini-ducted head units and multi-zone configurations have seen growth. New construction and light commercial are becoming more popular as well.

Four of the five distributors and retailers are selling DHPs that are installed in commercial businesses, manufactured homes, new homes, and attached multifamily homes. They had a hard time estimating what percentage of sales each of these represented, but thought that commercial installations had increased in the past 12 months. Two noted cost as a barrier to new construction because an entry level ducted system is less expensive and the multistep installation is more expensive. The one barrier mentioned for the multifamily market is the split incentive between the owner and occupant.

Interactions with Installers

Three of the distributors rely on the installers to market residential DHPs and work with the installers to ensure they are using appropriate messaging. This is done through providing guidelines, reviewing marketing materials, and training. Notably, none of the distributors interviewed saw any evidence that the utility rebates were resulting in higher DHP prices.

None of the suppliers reported any technical difficulties experienced by installers. Two of the three distributors selling in the residential market indicated they would sell DHPs to non-HVAC technicians such as electricians with refrigerant licenses. One stated that this should only be to a very small amount with the appropriate license out of concern that this would take resources and business away from the HVAC technicians.

Initiative Interactions and Impacts

Five of the suppliers interviewed had consistent contact with the Initiative during 2014, listing regular meeting attendance, joint participation in promotion efforts, and helping with dealer events. The manufactured homes representative interviewed had not had contact with the Initiative recently, but recalled more contact several years ago. All are planning to work with NW Ductless Heat Pump Project in 2015, including the manufactured homes representative who would like to get more information on the Initiative. The other suppliers noted that they have already attended meetings, helped at events, and increased marketing efforts and are planning to continue throughout the year.

Three of the suppliers say they already had positive views of the DHP technology so the Initiative has not influenced their view of the DHP market. The other three believe that it has affected their view positively and in one case it spurred the company to invest in DHPs.

With respect to marketing, the respondents are split again with half saying the Initiative has influenced their marketing and half saying it has not influenced. The Initiative has drawn more attention to DHPs and resulted in suppliers focusing their marketing on incentivized products more. Having the marketing materials provided by the Initiative has also influenced marketing.

One supplier expressed hopes that the Initiative continues providing third-party support of the DHP technology and doesn't completely pull out of the DHP market. The other areas suppliers would like support for are both financial. One supplier recommended more financial support for advertising and marketing for DHP dealers and installers, and another supplier recommended finding ways to bring the installation costs down.

Future Expectations and Needs

Improvements for cold climates topped the list of technological trends suppliers are seeing. This was followed by increased energy efficiency, and features to improve aesthetics and whole home functioning.

Opinions were mixed on what will happen with the DHP installation price in the future. Two suppliers thought that it would continue to come down as the market is not yet mature and is

becoming more competitive. The others thought it might stay the same or increase since installers will need to keep up with the increasing cost of the equipment. Despite this, suppliers are optimistic with one expecting to maintain position and the others expecting to see large growth. None of them see any problem keeping up with this demand either. However, the utility incentives are seen as an important factor in the predicted growth.

One issue mentioned by the manufactured homes representative is the requirement that homes with DHPs also still have wall heaters installed is detrimental to sales.

The distributors thought that the goal of having DHPs installed in 85% of single-family, zonal heat homes is fairly ambitious, and might take 10-15 years. They recommended more incentives and more marketing to increase awareness and educate customers on the heating cost comparisons.

While two suppliers still consider awareness to be a primary market barrier one specifically stated that awareness is not a barrier. The other barrier mentioned by more than one supplier is cost. The cost of a DHP is not going to come down enough to be accessible to everyone. When asked if they had any final thoughts or comments about DHPs, the market or NEEA's Project, most took it as an opportunity to compliment the DHP technology and NEEA on what the Initiative has accomplished.

5.6 PARTNER UTILITY INTERVIEWS

ILLUME completed 21 utility and non-utility program sponsor interviews. Nineteen of the utilities interviewed are currently running DHP programs. The interviews were designed to assess:

- Program designs and models, including target markets, messaging approach, incentive levels
- Changes in the program and market for DHPs since the last assessment
- Barriers and opportunities for the technology from their perspective
- Usefulness of the Initiative in supporting their program delivery, and areas for opportunity and improvement

The utilities in the sample included some of the most and least active utilities in the Initiative. Utilities interviewed include 10 from Washington, six from Oregon, three from Montana and two from Idaho.

Target Markets

Of the 19 utilities interviewed that are currently running DHP programs, all are targeting single-family and manufactured homes. Nine are targeting, or at least wouldn't exclude, multifamily homes, usually up to four units. A few utilities noted that while they allow manufactured and multifamily homes, there just aren't many in their service area.

Marketing Methods and Messages

The utilities promote their programs in a variety of ways. Eleven include information on their website, 10 do some type of direct mail including traditional direct mail, Ruralite, other

magazines and newsletters. Nine do radio or TV, eight do newspaper ads, and seven do bill inserts and social media. Promoting through the installer network and home shows were also mentioned by a few utilities. Billboards, and bus and movie theater advertising were mentioned by one utility.

With respect to promotional efforts, the largest number of utilities thought that the level of their efforts had remained the same over the past year and expected them to stay the same in the next year. Seven utilities had increased their promotional efforts in the past 12 months and five were expecting to increase in the next 12 months. While four utilities noted that their promotional efforts had decreased in the past year none were expecting a decrease to promotional efforts in the next year. Lack of time and budget and already good participation contributed to the decreases in promotional efforts.

Few utilities actually use the term "displacement theory" when talking to customers, however, the majority are promoting it directly or through their installers without using that term. Several noted that customers are required to have a backup heat source. Of those that don't talk about displacement theory, only one noted that a lot of their installations are 100% DHP.

Nine of the utilities have some type of display unit in their office. Four of those units are functioning and the rest are display only units. A tenth utility has a functioning mobile unit that they take to several home shows each year. Six of the utilities expressed that their display unit has been valuable to their DHP program.

Current and Anticipated Rebate Levels

All but one of the interviewed utilities is currently offering rebates for existing zonal heating and twelve are offering incentives for existing forced air furnaces, with two additional utilities mentioning that they are starting to look into offering incentives for forced air furnaces. The rebate amounts ranged from $600 to $1,200 for zonal heating and $800 to $1,200 for forced air furnaces. One utility stated their incentive is calculated on a case-by-case basis and one offers a $500 incentive for any system that is not 100% electric in addition to their rebate for electric systems.

While many of the interviewees struggled to provide an estimate, the DHP rebates currently account for between two percent and 40% of the utilities' residential portfolios based on these estimates. None of the utilities interviewed have an expected time frame for ending DHP rebates as most consider them high-priority measures. However, several representatives did note that how long they can continue to offer DHP rebates depends on BPA and the Regional Technical Forum. Only one of the representatives thought their rebate would increase in the next two years. About half said how their rebate amount changes in the next two years depends on BPA and the remaining utilities were split between predicting a decrease and staying the same.

Financing

Eight of the interviewed utilities are currently offering financing for DHPs. Interest rates on these loans range from zero percent to 7.7% on loan amounts ranging from up to $5,000 to up to $15,000. Customer uptake on the loans ranges from none or just a few per year to about 40% of customers participating in the Initiative. Most of the utilities offering loans were happy with their

financing programs and didn't see anything that needs to change, aside from one utility that thought their interest rate should be lowered for all HVAC equipment.

There is not much interest in offering financing among utilities that are not already offering it. Reasons for not offering financing include the difficulty in doing so as a public utility, lack of cost effectiveness, other priorities, former loan programs that were not successful, and the availability of loans through other sources such as installers and local lenders.

Installer Support

Thirteen of the utilities are offering some type of support to the installers. This is most often by including them in an "approved installer" list or by providing training. Though a couple utilities commented that the need for training has decreased as most installers have been doing this awhile now and that the manufacturers also provide good trainings. Only three of the utilities said they are providing marketing support and one of those noted that while they offer it, very few installers use it.

Six of the utilities are not currently offering support to the DHP installers but one of those is looking into what they can do and also mentioned that they support the installers indirectly through CLEAResult and NEEA. One utility did not respond to this question.

Non-Energy Benefits

For the most part, utilities were enthusiastic about the non-energy benefits their customers are getting from the DHPs. Most responded in terms of how happy the customers have been with their increased comfort. One even stated that the increased comfort and energy savings are driving trust and satisfaction with the utility. Other non-energy benefits noted were the quietness, cooling and ease of use. Only two utilities did not believe the DHPs were delivering any non-energy benefits to their customers and one noted that while they consider the cooling a non-energy benefit, this is not something they can quantify to share with the utility commission or use in screening. Quantifying the non-energy benefits was also identified as an area that perhaps NEEA could research.

Cost Effectiveness

There were somewhat mixed opinions regarding cost effectiveness of DHPs. With respect to utility cost effectiveness, eight responded that they do have concerns. These concerns were usually due to the potential for lowered energy savings coming from the Regional Technical Forum. One utility also has concerns due to their very low cost of electricity. Three utilities expressed concerns with cost effectiveness from the homeowner perspective, indicating that the high installation costs were a concern.

The one utility that is not currently offering a DHP program said that they are not doing so because it is not a cost effective measure for them but that they would consider it if the cost was lower and they had a customer segment that would benefit from them. However, as a dual fuel utility they do not have a lot of all electric customers that would benefit from ductless heat pumps.

Goals and Barriers

Few of the utilities interviewed had specific installation goals for their DHP programs in 2014, but almost all expressed either that they were pleased with program performance or met their goal if there was one. Only four utilities expressed that they did not meet goals or that customer uptake was slower than anticipated.

Cold climate is not generally a concern. Only four utilities mentioned that it is a concern at all, though not a major one and easily overcome by keeping existing systems for back up. One utility noted that it was a concern in the beginning but now the utility is taking calls from people who can't believe their DHP is still working in zero degree weather.

Cost and the economy are the largest barriers to selling DHPs. Awareness or acceptance is also still an issue, both among customers and installers, as a couple utilities stated that installers not being fully on board with DHPs was a barrier in their service area.

Inspections

Of the 15 utilities that responded to this question, 12 are inspecting installed DHPs. Half of those utilities are inspecting 100% of the installations, one quarter are doing random inspections and one quarter reported they are contracting with NEEA and/or CLEAResult for inspections. Inspections have been going very smoothly with no major issues and any minor issues being corrected quickly. One utility noted that while most installers have been doing great for all six years they've been running the program, the "dabblers" who aren't installing DHPs routinely do have more problems. One utility said that additional assistance in the form of training or an inspection checklist would be helpful. The three utilities that aren't currently performing inspections cited a lack of time and money or that they just haven't done it in the last couple years.

Regional Initiative and Coordination

The utilities were all happy with their current implementation arrangements[27]. Of the utilities currently implementing their own programs, only two mentioned the possibility of going to an external contractor in the future. Utilities only had favorable things to say about working with CLEAResult and the Initiative portal.

Only one utility representative did not think they were able to stay well informed about NEEA's activities. This particular representative felt there must be communications they are missing but the remaining representatives felt they were able to stay well informed and have themselves or another staff member attend the NEEA webinars. There were only a few suggestions for improving communication. Earlier notice of webinars and store promotions was one suggestion mentioned by a couple utilities, and one mentioned that the webinars have suffered from some technical difficulties and excessive background noise recently, which has been distracting.

[27] Most of the utilities interviewed are implementing their own DHP programs, 9 implement their own programs, 7 work with CLEAResult for at least part of the process, 2 work with BPA, 1 works with UAMPS

Information and Support

The Initiative website is widely used, with 16 of the utilities saying they've used it in the past three months and one saying that while they don't use it, they regularly refer customers there**.** Most utilities thought they probably used the website about once or twice a month. Utilities have no trouble finding what they are looking for which is usually the installer list, either for utility use or to refer customers, forms, and marketing resources.

While utilities don't have problems finding what they are looking for on the website, they did offer several suggestions for improvement. Suggestions included providing a link to the heating cost from the customer page, providing videos of the DHP technology, and making it easier to find information. One utility noted that it depends on the goal of the website, while it works well for their purposes they have heard from customers that it isn't the best website. And one utility was confused over the number of websites, stating there were separate sites for installers, consumers, and utilities, in addition to goingductless.com.

All utilities that have used the technical resources and marketing support are very satisfied with these resources. A couple noted that even though they don't use the marketing materials they appreciate the fact that the resources are there.

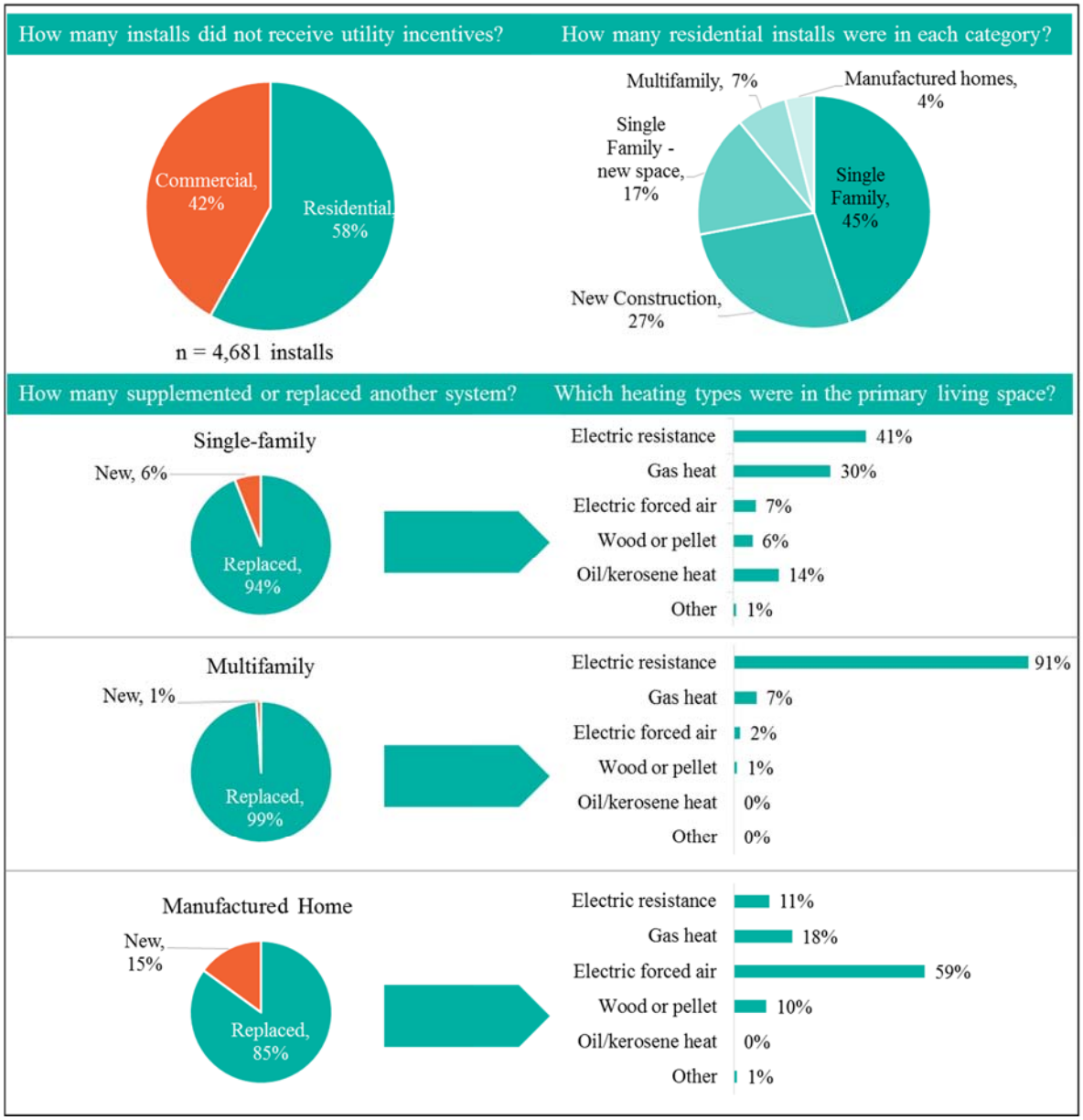
Regarding which features of the Initiative have worked best, utilities most commonly cited the variety of resources available to installers, utilities, and homeowners. Having the NW Ductless Heat Pump Project available as a third party that has been able to address the whole supply chain and having CLEAResult available were also mentioned by multiple utilities.

When asked how the Initiative might better serve their utilities' DHP programs, most utilities responded that they were very happy with the program and did not have any suggestions. There were a couple general suggestions to improve customer education, outreach, and implementation support. One utility offered that NEEA should focus their efforts on continuing to follow through with the DHP program, especially the manufactured home area, as there is a lot of potential left rather than pushing other products like heat pump dryers and heat pump water heaters. Another had very strong feelings that after five years in, the program is past the point of trying to "market better" and should be focused on making DHPs a viable long-term product in utility portfolios. One way they recommended doing this is having the Initiative look into the cost effectiveness to see if there is a way to quantify the non-energy benefits or otherwise improve the cost effectiveness of DHPs.

6. NON-INCENTED DHP MARKET ANALYSIS

The survey of the DHP installers included a number of questions used to assess the number and types of DHPs being installed in residential and commercial applications in the Northwest. Compared to the previous market progress evaluation commercial installations have dropped from 48% to 42% while new construction installations have increased from 21% to 27% of the residential market. See Appendix C for a supplemental table of results.

Figure 23. 2014 Non-Incented DHP Installations[28]



[28] Percentages that supplemented or replaced another system are based on installer responses to the question: "How many of your single-family/multifamily/manufactured retrofit installs supplemented or replaced another system?

7. KEY FINDINGS AND RECOMMENDATIONS

Overall, the Initiative is continuing to perform well and make progress towards market transformation. In this section, we present some of the key findings from the evaluation activities, and recommendations for the Initiative:

1. **Customers' interest in DHPs is increasing.** Installers reported that the number of customer requests for DHPs increased from the prior year. The percentage of installers that reported this higher interest increased from 43% in the prior MPER to 52% in this study.
2. **Customers continue to rely on others as a central point of information.** Word of mouth and information from acquaintances remain the primary source of initial information on DHPs.
3. **Customers are becoming more likely to rely on their own research than installer recommendations in their decisions.** Installers' influence on customers' decisions decreased from the last MPER while reliance on internet research and other customer reviews has increased.
4. **Households that installed DHPs continue to have high satisfaction with the product and recommend the product to others.** Almost 95% of participants said they were satisfied or very satisfied with their DHP. In addition, over three-quarters of respondents say they have recommended a DHP to others. This is important given how much importance households place on recommendations and reviews from others. These recommendations may be instrumental in further promoting the adoption of DHPs in the market.
5. **Aesthetics with DHPs is a barrier for purchasing a DHP; however, this does not remain an issue post-installation.** Both installers and participants cite this as a barrier but participants indicate they quickly move past aesthetic concerns post installation.
6. **NEEA's Initiative continues to drive market transformation among DHP suppliers and installers.** Suppliers want to continue to cultivate partnership channels with the Initiative including coordinating on marketing. About half of the suppliers indicated that the Initiative directly influences their marketing and that they dedicate marketing efforts to incented products. In addition the non-incented savings analyses shows an increase in the number of non-incented units being installed in the market which aligns with the data tracked by CLEAResult.
7. **Master Installers are proving to be a strong driver for activity through the Initiative and tend to be more sophisticated in their DHP business than other installers**. Master Installers are more likely to have been offering DHPs longer, install more DHPs on average, report a higher percentage of their revenue from DHP sales, and use Initiative marketing materials and the Initiative website to communicate about DHPs to customers. Nearly 40% of Master Installers installed more than 20 units in 2014 compared with 98% of other installers that installed 20 or fewer units in 2014.
8. **Installers and other market actors interviewed believe the manufactured homes market continues to have high, untapped potential.** Installers note they have nearly doubled their recommendations for customers living in manufactured homes to install DHPs since 2013.

9. **Average residential install costs for a single indoor head, single outdoor unit (1:1) installation is staying steady at about $4,000.** Suppliers do not believe Initiative rebates are inflating prices in the region nor do they expect costs to decrease in any significant way in the near future.
10. **The newly revised logic model is clear, relevant and evaluable.** The Initiative is making progress on the short-term market progress indicators as indicated by increases in consumer adoption, supply chain adoption of 1:1 displacements and aesthetics becoming less of a concern. There is also evidence of increased awareness and interest and diminishing concerns around DHP performance which are key components to increasing purchase funnel, identified as a mid-term outcome.

To continue building on the Initiative's success, NEEA should:

1. **Identify strategies for engaging more installers to become Master Installers.** Master Installers dedicate more time and hours to the technology and drive significantly more volume of units than other installers. Identifying strategies to increase the numbers of installers who become Master Installers will help in achieving the long-term market share goals. Future studies should explore the barriers installer perceive to becoming Master Installers.
2. **Continue to identify means to support installers (with particular focus on smaller organizations) and to encourage a higher number of installations per installer**. A considerable portion of installers installed 20 or fewer units per year; in fact, nearly half of the Master Installers, and 98 percent of other installers, installed 20 or fewer incented units in 2014. Additional investment should be made in increasing the number of units installers are installing through the Initiative. For example, smaller installers indicate they want more support and training. Partnering with the distributors to include information on the Initiative in their trainings may help reach the smaller installer markets and could be an effective way to increase the number of installers involved in the Initiative and the number of units being installed.
3. **Focus on increasing outreach to retailers.** A goal of the Initiative is to increase the availability of DHPs at retailer, in order to achieve this, additional emphasis should be placed on developing strategic partnership and relationships with retailers of DHPs in the region
4. **Continue to think about what the next step is in the market transformation continuum for DHPs.** The Regional Technical Forum provides a central source of energy savings data and assumptions for measures commonly installed in the northwest, including DHPs, Measure-level assumptions are revisited periodically to determine if adjustments should be made for issues such as changing baselines and standards. There is discussion that DHP savings may be reduced per the Regional Technical Forum which is raising concern over the future of the Initiative. Making DHPs a viable, long-term product will require getting a larger portion of installers to make DHPs a primary driver in their business model and/or looking at lower cost mid-stream approaches to incenting market transformation.
5. **Reassess the 85% by 2029 market penetration goal.** Assuming an eligible market of 728,047 households, the penetration of DHPs in the market is currently 13 percent (97,149/728,047 eligible households). Assuming that could grow to a target regional zonal market saturation of 85% in just 14 years appears optimistic.

APPENDIX A – GLOSSARY

British Thermal Unit (BTU). A unit of heat energy. One Btu is the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. British Thermal Units per Hour (BTU/H). A measure of cooling or heating capacity.

Central Air Conditioning System. System in which air is cooled at a central location and distributed to and from rooms by one or more fans and a series of ducts.

Compressor. A component of the refrigeration cycle, which draws low pressure/temperature refrigerant gas from the evaporator (indoor unit) and delivers in high pressure/temperature form to the condenser (outdoor unit).

Ductwork or Ducts. Hollow metal pipes used to transfer air throughout your house.

Heat Pump. Cooling/Heating system that can reverse the direction of refrigerant flow to provide heating or cooling to the indoor space as needed.

Indoor Unit. The evaporator unit, which contains a heat exchanger coil, fan, air filters and remote signal receiver. Sometimes also referred to as “heads.”

Initiative. NEEA’s NW Ductless Heat Pump Project.

Installer. A business that installs DHPs. Can also be referred to as a contractor or installation contractor.

Inverter Technology. Compressors with inverter-driven technology reduce power consumption and thus save energy by varying the compressor speed to meet load requirements. The system operates at a more steady revolution, maintaining desired temperature more evenly for better comfort.

Master Installers. Installers who attend Orientation and Best Practices training and have completed a minimum of 25 total installations (15 or more utility-incented installations), in the last three years. In order to qualify, installers must also submit installation activity, at least one homeowner testimonial and photo-documentation of two utility-incented installations in addition to completing the Master Installer agreement.

Multi Zone Ductless System. A system that features a single outdoor unit (condenser) connected to multiple indoor units or heads, providing zoning capability through individual remote thermostats that control temperature and air flow for each room or zone.

Other Installers. Installers who install DHPs and participate in the initiative but have not become Master Installers.

Outdoor Unit. A condensing unit that contains compressor, condenser coil, propeller fan and circuit board. Programmable Thermostat. A thermostat with the ability to preset different temperature/time settings for heating and cooling equipment.

Participant. A homeowner who has received a rebate through their utility for the purchase of a qualifying DHP.

Refrigerant. A gas/liquid substance used on refrigeration cycle to provide cooling by absorbing and dispersing heat.

Refrigerant Lines. Two copper lines that connect the outdoor air conditioner or heat pump to the indoor evaporator coil.

Short-run system. Also called a concealed duct unit. These units are mounted in the ceiling of rooms where minimal visibility of the heating and cooling system is desired or wall space is limited. A small vent opening in the ceiling is all that is visible.

Split System. Refers to an air conditioner or heat pump that is combined with indoor components, such as an evaporator coil inside and a condenser coil outside the home.

Thermostat. A device that monitors and controls the temperature inside a home. The remote control is most commonly used as a thermostat on ductless split systems.

Ton. Measurement of system cooling capacity. 1 Ton is equivalent to 12,000 BTU/H.

Zoning. Ductless systems manage environments individually with remote thermostats that control the temperature and airflow for each room or zone. In multi-split ductless systems, households can set different temperatures for different rooms or areas according to individual preference

APPENDIX B – LOGIC MODEL REVIEW MEMO

To: Anu Teja

From: Sara Conzemius, Megan Billingsley, ILLUME Advising

Date: February 13, 2015

Re: Review of the DHP Program Logic Model

The objective of this memorandum is to provide the results of ILLUME's review of the Ductless Heat Pump (DHP) Initiative logic model. Our comments and suggestions are based on a review of the draft logic model, the NEEA Logic Model dated April 8, 2014, the memo outlining DHP Initiative changes, the logic model documentation, and interviews completed with key NEEA staff. As we reviewed the logic model and associated documents, we looked for a clear chain of events between program activities and outcomes and that the outcomes were reasonable and could be measured through the Market Progress Indicators.

Revision to the logic model made in 2014 included making key changes, which included:

1. Updating the documentation package (theories and assumptions tables),
2. Updating barriers,
3. Adding "Manufacturer engagement" as an Activity area,
4. Rewriting Outputs to more specifically identify Initiative outputs, and
5. Adding explicit incorporation of MPIs into Outcomes.

Highlights of these changes include:

- The addition of two new barriers: "Concerns with aesthetics", "Poor in-field performance from improper sizing, product choice, and design".
- The removal of one barrier: "Inconsistent code interpretation".
- One revamped barrier: "Lack of Customer Awareness" -> "Slow customer progress through purchase funnel".
- One new long-term outcome "DHPs displace majority of electric resistance heating load in target markets".

Overall, we found that the current logic model sufficiently captures the barriers, includes current program activities, and those activities lead to concrete outcomes. The Market Progress Indicators are measurable as described. The logic model is well thought out and at this point, captures the range of actions NEEA can take within its program scope.

While we do not recommend any significant changes to the logic model at this time, we do have a few recommendations that may help streamline the logic model and provide additional insight into the activities NEEA completes to support DHP market transformation.

1. *Consider adding additional information/clarification about NEEA's role in any Marketing efforts.* Currently under Marketing, there is no target audience listed for the marketing plan or campaign, and no indication as to what is NEEA's role in these activities. After discussions with program staff, we determined that there are no NEEA marketing activities targeted at homeowners, marketing activities are currently being

targeted at installation installers, retailers, and manufacturers. The documentation included also indicates that "the marketing will be conducted by utilities, retailers, and manufacturers", but it does not supply sufficient insight into what activities NEEA is taking under Marketing.

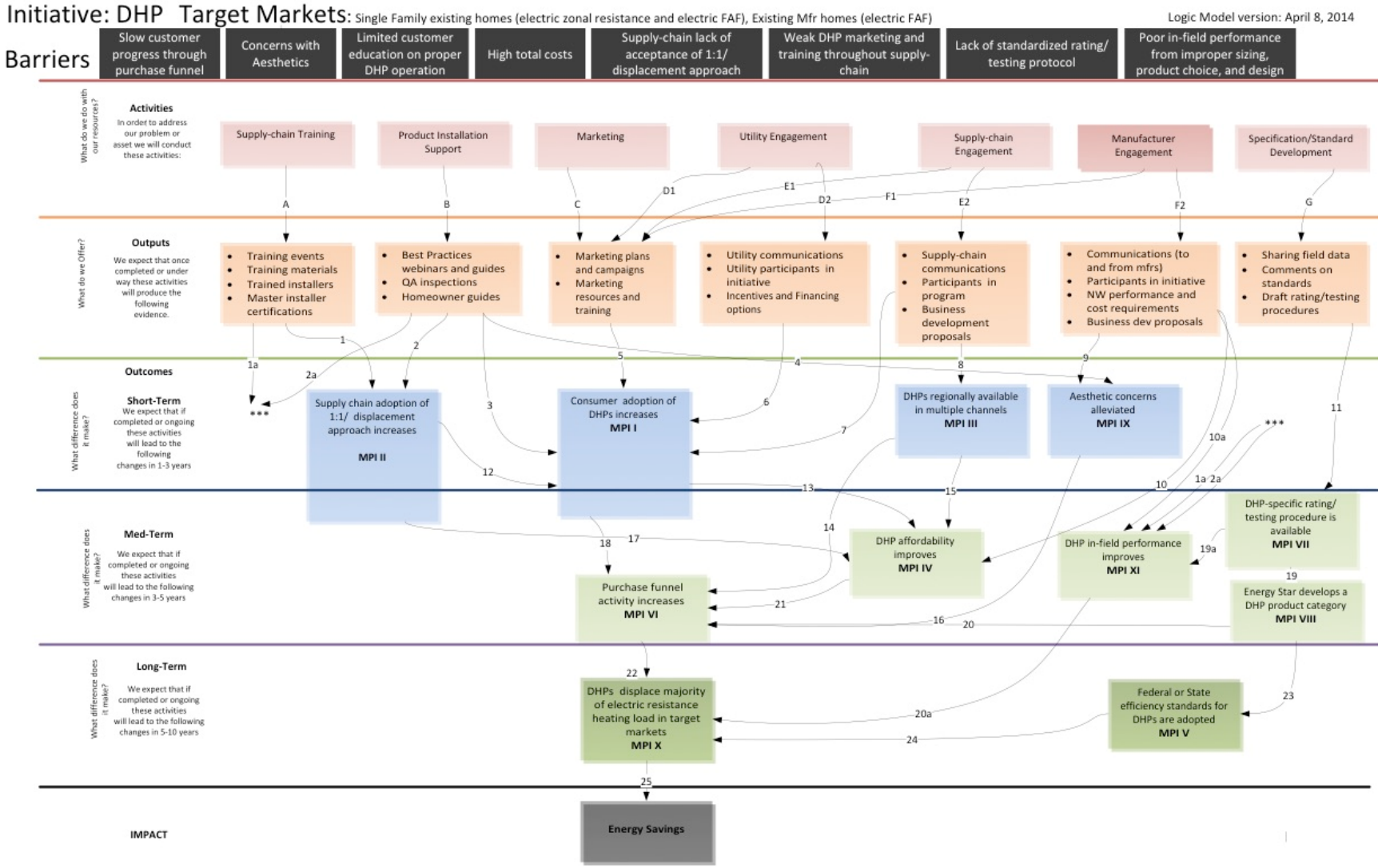
2. *Consider adding an additional linkage from Marketing to Aesthetics Concerns Alleviated.* At present, linkages exist between Product Installation Support and Manufacturer Engagement, and while these activities as described can have a significant impact on aesthetic concerns once they're installed, or in the future with changing designs, there may also be a way to influence consumer perception of the aesthetics through marketing activities taken by partner organizations.

3. *Consider including activities occurring outside the DHP Initiative that may have significant impact on the effectiveness and implementation of the program.* Under the Activity Specification/Standard Development, there were a number of activities identified to promote standards and codes once they had been proposed and out for comment. However, there is nothing in the logic model that indicates what activities program staff could, or do, take to encourage the development of those rules. After discussion with program staff, we discovered that there is another department in NEEA that actively interacts with outside government agencies to promote the development of new codes and standards. It might be worth considering the inclusion of their activities in the logic model as they are a crucial first step, and activities NEEA is already taking, to promote market transformation for DHPs.

4. *Consider including a key or legend to explain any non-standard symbols on the logic model.* During the initial review of the logic model there was some confusion interpreting some of the linkages, specifically, those with an additional letter or number (i.e. D2 or 19a). Similarly, there was some initial confusion about what the "***" indicated. Inclusion of a key or legend may help alleviate those initial moments of confusion.

5. *Consider an annual exercise in mapping progress against the logic model and market progress indicators.* If not already done, completing a step-by-step and review of specific progress against the logic model itself will allow NEEA to think critically about the outputs and outcomes established and ensure the activity in place is in line with the aggressive 85% market penetration goal. This type of activity is an important step in any market transformation program assessment.

Figure 1: Ductless Heat Pump Initiative Logic Model



APPENDIX C – NON-INCENTED DHP INSTALLATIONS

The installer survey asked installers to estimate the number of incented and non-incented installations for each of the different housing types shown in Table 6.

Table 6. 2014 Non-Incented DHP Installations

Installation Application	2014 Percentage (n=4,681 installs)	2013[29] Percentage (n=1,455 installs)
Total Non-Incented Installations	100%	100%
Commercial	42.3%	48%
Residential	57.7%	52%
New Construction (single and multifamily)	27.3%	21%
Single Family - In new, add-on space	17.4%	29%
Single Family - In primary living space	45.0%	48%
Displaced electric zonal	41.0%	51%
Displaced gas heat	30.3%	26%
Displaced electric furnace	7.5%	10%
Displaced wood or pellet	5.8%	3%
Displaced oil or kerosene	14.2%	3%
Displaced other heat	1.3%	2%
Don't know	0.0%	5%
Multifamily - In primary living space	6.6%	1%
Displaced electric zonal	90.7%	43%
Displaced gas heat	6.8%	14%
Displaced electric furnace	1.9%	14%
Displaced wood or pellet	0.6%	14%
Displaced oil or kerosene	0.0%	0%
Displaced other heat	0.0%	14%
Manufactured Homes - In primary living space	3.8%	2%
Displaced electric zonal	11.4%	46%
Displaced gas heat	17.7%	0%
Displaced electric furnace	59.5%	54%
Displaced wood or pellet	10.1%	0%
Displaced oil or kerosene	0.0%	0%
Displaced other heat	1.3%	0%

[29] Evergreen Economics. 2014. Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3.

Q22 & Q22a. How many of DHP installations in 2014 did NOT receive a utility incentive?
Base: Installers who installed residential DHPs in 2014, n = 158
Q 35. About how many residential-size DHPs – units of 3 tons or less – did your firm install in commercial establishments in 2014?
Base: Installers who install in commercial facilities, n = 108.
Q 25. How many of your non-incented, residential units in 2014 were in the following types of projects: new construction, single family - new or add-on space, single family home retrofits, multifamily home retrofits, manufactured home retrofits?
Base: Installers who had residential installations, n = 158.
Q 28. How many of your single-family retrofit installs supplemented or replaced another system?
Base: Installers who installed units in single-family homes. n = 98.
Q 29. Of these supplemental or replacement applications in single-family retrofits, how many had the following heating types in the primary living space?
Base: Number of single-family retrofit installs that supplemented or replaced another system. n = 87.
Q 30. How many of your multi-family retrofit installs supplemented or replaced another system?
Base: Installers who installed units in multi-family homes. n = 12.
Q 31. Of these supplemental or replacement applications in multi-family retrofits, how many had the following heating types in the primary living space?
Base: Number of multi-family retrofit installs that supplemented or replaced another system. n = 11.
Q 33. How many of your manufactured home retrofit installs supplemented or replaced another system?
Base: Installers who installed units in manufactured homes. n = 30.
Q 34. Of these supplemental or replacement applications in multi-family retrofits, how many had the following heating types in the primary living space?
Base: Number of manufactured home retrofit installs that supplemented or replaced another system. n = 24.

APPENDIX D- ACE MODEL REVIEW MEMO

1. OVERVIEW

This memo summarizes the preliminary findings from the Ductless Heat Pump (DHP) Alliance Cost Effectiveness (ACE) model review conducted by ILLUME Advising, LLC (ILLUME) on behalf of the Northwest Energy Efficiency Alliance (NEEA). NEEA is a non-profit organization that uses the "market power of the region to accelerate the innovation and adoption of energy-efficient products, services, and practices." NEEA is an alliance of more than 100 Northwest utilities and energy efficiency organizations working on behalf of more than 13 million energy customers.

NEEA launched the Northwest Ductless Heat Pump Initiative in 2008 as a pilot that set out to demonstrate that DHPs were a viable technology to displace electric resistance heat in existing homes. This study will help inform NEEA as they review technology and Initiative cost effectiveness and in setting and adjusting long term market transformation goals for DHPs in the region. This review focused on a set of five assumptions provided to ILLUME in October 2014 and was conducted by reviewing the supporting documentation that was provided subsequently. This memo will ultimately be included as a chapter in the final 2014 DHP Market Progress Evaluation Report (MPER) that will be delivered in June 2015.

Below is a summary of the key findings.

Finding 1. The market size for homes with forced air furnaces should be adjusted slightly to 222,981 to account for those homes with forced air furnaces (FAFs) that installed DHPs through the program in 2010.
Finding 2. The application of the housing type data from the 2013 MPER is still appropriate and should continue.
Finding 3. The forecast for baseline installations of DHPs in existing homes with forced air furnaces needs to be significantly revised from 43% down to 10% to reflect the true likelihood that homeowners would install in absence of the Initiative.
Finding 4. Several adjustments should be made to the ACE Model key assumptions including changes to the market size for forced air furnaces and the first cost of DHPs in both forced air furnace and zonal heating installations.
Finding 5. NEEA should consider extending the target date for achieving 85% market saturation for DHPs in zonal markets from 2029 to 2039.

2. EVALUATION QUESTIONS

This section presents preliminary findings for each of the five ACE review questions that NEEA provided to ILLUME for review. While a majority of the units installed through the Initiative are installed in homes with zonal heat, the uptake of DHPs in homes with FAF is a goal for NEEA as well. Many of the zonal heat assumptions were reviewed in earlier MPERs causing NEEA to

ask ILLUME to focus on a number of the assumptions related to homes with FAFs. Specifically the following items were identified for review:

1. Review the market size for homes with FAFs.
2. Review the application of the 2013 MPER to track housing type of where the DHP is installed.
3. Review NEEA's initial forecast for the installation of ductless heat pumps in existing homes with FAFs.
4. Review 2014 ACE Model key assumptions.
5. Review whether a market saturation of 85% by 2029 is reasonable for existing single-family homes with zonal heating systems.

Findings relating to each of the five researchable issues are discussed in detail in the following sections.

2.1 MARKET SIZE FOR HOMES WITH FORCED AIR FURNACES

Question: Is the market size assumption for homes with FAFs appropriate?

Overview/Current Approach

NEEA's market size for homes with FAFs, 222,886 homes, is calculated from the Residential Building Stock Assessment (RBSA)[30], as well as incented installs of DHPs for 2009. The 2011 RBSA survey estimates the number of existing single family homes with electric FAFs is 222,745. Added to this number are the 2009 DHP incented installs, 141, found in the spreadsheet Forecast Summary DHP FAF. Combined, these numbers result in the total of 222,886 homes. The 2009 numbers were added to account for those FAF homes that installed DHPs via the program that would not have done so in absence of the program and as such would have been part of the original baseline.

Recommendation

ILLUME reviewed the referenced the RBSA report, the 2013 ACE review completed by Evergreen Economics[31], as well as the Forecast Summary DHP FAF spreadsheet. The 2013 ACE review suggested there was some concern with the use of the RBSA report for establishing the market potential for homes with zonal heat, because the zonal number did not account for households that previously had zonal heat but had subsequently installed DHPs at the time of the

[30] Ecoptope, Inc., 2012. "2011 Residential Building Stock Assessment: Single-Family Characteristics and Energy Use." Prepared for the Northwest Energy Efficiency Alliance. September 18, 2012.

[31] Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3, Evergreen Economics, April 24, 2014

RBSA study. In order to address this when setting the FAF baseline NEEA added the 141 incented installs from 2009 to the total found in the RBSA study. Given the RBSA study was completed in 2011, NEEA may want to add the 95 incented installs that occurred in 2010 to the baseline number as well taking the total to 222,981. It should be noted that these small additions are insignificant in the context of the total baseline and but for the sake of consistency NEEA should consider making this adjustment.

2.2 APPLICATION OF THE 2013 MPER TO TRACK HOUSING TYPE WHERE DHP'S ARE INSTALLED

Question: Is the approach to track housing type where DHPs have been installed, as outlined in the 2013 MPER, still appropriate?

Overview/Current Approach

NEEA has an interest in understanding where both incentivized and non-incentivized DHPs are being installed across the region. To date this has been accomplished through the combination of activities:

1. Surveys completed by households that installed DHPs, representatives of Northwest utilities with DHP programs, and staff from DHP manufacturing and distribution firms that asked specific questions focused on understanding in which sector units are being installed;
2. Information collected on incentive forms by the program implementer CLEAResult; and,
3. Sales data from DHP distributors.

This comprehensive approach to collecting market information provides a strong set of data points that provides a reasonable estimate for tracking housing types of DHP installation and setting program goals.

A database of sales data from 12 regional DHP distributors has been developed and identifies total sales, incented sales, and cooling-only applications. Non-incented sales are then estimated by subtracting incented sales and cooling-only applications from the total sales. This approach provides a reasonable assessment of the market conditions in the region and is in-line with how other states have established tracking for incented and non-incented units in programs[32].

Using this data the total sales are categorized to give a clear picture of the DHP market and where sales are occurring. The categories tracked include:

1) Sector (commercial or residential),
2) Housing type (new construction, single family, multi-family, or manufactured home), and
3) Displaced heating type.

[32] For example in Wisconsin the Furnace and Air Conditioning Tracking System was in place for 10 years, was the base for annual program evaluation and aligned with the NEEA methodology.

The 2013 MPER survey included several questions to installers regarding non-incented DHP installation. Results from these questions were used to determine the percentage of sales for each of the categories listed above. The percentage is then applied to the calculated non-incented sales in order to estimate overall non-incented sales by category. Incented sales are tracked based on information in the rebate application. Table 1 provides an overview of the current non-incented market percentages by sector and housing type:

Table 1: 2013 MPER Non-Incented DHP Market Percentages

Market Sector	Percentage
Commercial Sales	48%
Residential Sales	52%
New Construction	18%
Single Family – New or Add-On Space	39%
Single Family – Primary Heating Space	39%
Displaced Electric Zonal	52%
Displaced Electric Furnace	9%
Other / Don't Know	39%

Source: Northwest Ductless Heat Pump Initiative Market Progress Evaluation Report #3.

Recommendation

Using DHP sales data to estimate the percentage of sales of baseline zonal and FAF installations is reasonable and provides a good basis for establishing program goals. Having confirmed the data being used to determine these splits was gathered during the 2013 MPER and recognizing that study is less than a year old (April 2014) it stands to reason that the numbers should not have changed significantly since then and are the most reasonably available proxy for where units are being installed. Given this, ILLUME will confirm that these percentages should be used for the cost effectiveness review that will be completed for the program in early 2015. That noted, percentages should be recalculated annually and incorporated into forecast models. ILLUME will ask installers for this same information in the 2014 MPER and will compare those results to the 2013 results and the 2014 incentive data and will make additional recommended changes in the final version of this report for use in 2016 ACE review.

2.3 INITIAL FORECAST FOR THE INSTALLATION OF DHPS IN EXISTING HOMES WITH FAF

Question: Is NEEA's initial forecast for the baseline and regional installation of ductless heat pumps in existing homes with FAFs appropriate?

Overview/Current Approach

As discussed in Section 2.1, the estimated market size for DHPs in existing homes with electric FAFs is 222,886 homes. Within this market, DHP installations are classified as either regional or baseline, where incented installations and those that are not incented but are a direct spillover effect of the program are categorized as regional installs, and installs that would have naturally occurred without intervention are classified as baseline. Within NEEA's forecasting model, actual sales data is used through 2014. From 2014 through 2039, the installations are estimated by using an s-curve, which is built off of the actual sales data through 2013, market goals established by NEEA, and market predictions.

An s-curve is a common management tool that is often used to estimate market penetration. Variables used to generate the curve include 1) saturation - the maximum expected penetration after a product becomes mainstream, 2) start of fast growth – when penetration is 10% of the saturation value, and 3) takeover time – number of years for a product to catch-on. Together, these variables contribute to the curve that visually indicates the market penetration over time.

Market penetration for baseline installations is of interest and should be reconsidered in this model for a number of reasons. First, the current assumption results in baseline installations (43%) doubling regional installations (20%) in the year 2039, with baseline installations first exceeding regional installations in 2031. This result is notable because regional installations include both incented and non-incented, but program induced (spillover) projects, whereas baseline installations are supposed to be only those projects that naturally occur without intervention. If it is true that baseline installations would naturally reach 43% and double regional installations in absence of program intervention, one could argue the program is not necessary for achieving market transformation. Based on this review however, the problem is not a result of truly growing baseline market but instead in the assumptions in the s-curve predicting baseline sales. The estimate of 43% maximum baseline penetration by 2039 was identified in NEEA's DHP Segmentation memo[33] and is based on a survey completed by Russell Research in February 2009. It is noted in this memo that the method for determining the 2039 baseline percentage was a "quick and dirty" estimate. According to the memo, the maximum baseline estimate was calculated by looking at the number of participants who indicated they were "dissatisfied" with their heating system.

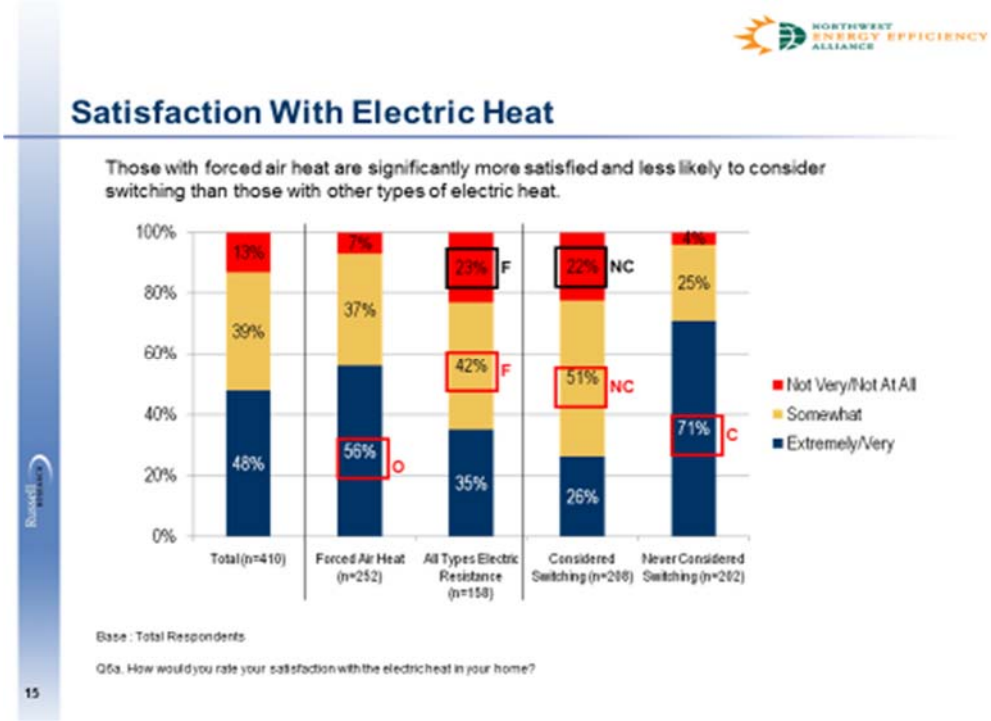
In this report, Russell Research[34] provides survey results that included responses to the question, *"How would you rate your satisfaction with the electric heat in your home?"* Homeowners with *Forced Air Heat* and *All Types of Electric Resistance Heat* responded to this question as Not *Very/Not At All, Somewhat,* or *Extremely/Very.*

To determine those participants who might be dissatisfied enough to replace their FAF with a DHP those who answered *"Not Very Satisfied"* and *"Somewhat Satisfied"* were combined. As shown in the Figure 1 below, seven percent (n = 18) of homes with forced air heat responded "Not Very Satisfied" and 37% (n = 92) responded "Somewhat Satisfied". These two when

[33] Memorandum: DHP Segmentation, NEEA, July 7, 2014
[34] Evaluation of the Consumer Market for Ductless Heat Pumps in the Northwest, Russell Research, February 2009

combined equal those identified as "Dissatisfied" (n=110 of total n = 42%[35]) noted as the base for the regional installs in the DHP Segmentation memo. ILLUME verified this was the data used to calculate the 42% for FAF by comparing these same numbers to those identified as dissatisfied with their zonal heating systems where 23% (n=x) of homes in the category of *All Types of Resistance Heat* responded *"Not Very Satisfied"* and 42% (n=x) responded *"Somewhat Satisfied"*, which totals the "Dissatisfied" rating of 64% mentioned in the memo. Figure 1. below provides the detail from the *Evaluation of the Consumer Market for Ductless Heat Pumps in the Northwest* report.

Figure 1: Source of customers classified as "Dissatisfied" for the purposes of establishing baseline sales of DHPs



Source: Russell Research 2009 *Evaluation of the Consumer Market for Ductless Heat Pumps in the Northwest*

The next steps in the "quick and dirty" approach to estimating the baseline adoption for the FAF market was to determine the ratio between the dissatisfied customers on both the FAF and zonal heating pools, and to apply that ratio, 42/64 (or 0.66), to the 65% baseline adoption that had

[35] These are rounded and the NEEA DHP segmentation memo indicated the Russell Research memo found that 42% were dissatisfied however the cross tabs from the Russell research show that number should be 43.6%. We are unclear if this was an error in the NEEA memo or in the presentation of the Russell data but for the sake of clarity we are referencing the number (42%) that are used in the NEEA Segmentation memo (despite the concern that there is an error in that memo). It should be noted this does not change our review or recommendation.

previously been established for zonal heating to the FAF market. This calculation results in the 43% maximum baseline adoption for the FAF market.

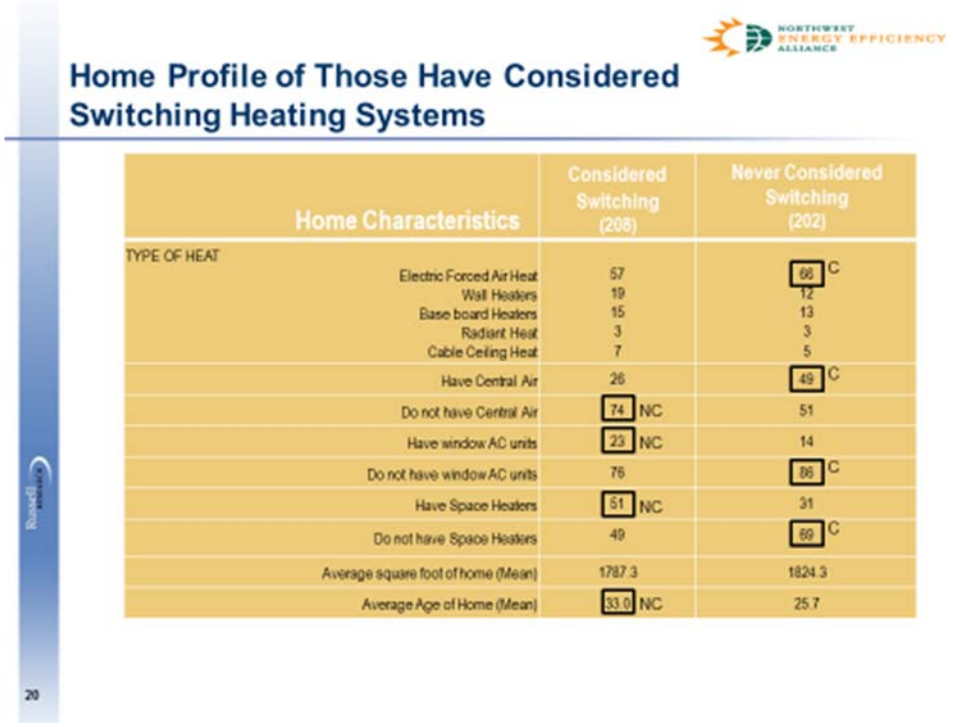
*(42/64)*65% = 43% maximum baseline adoption for FAF*

Based on this review, the approach of applying this ratio would be appropriate in absence of other market data. That noted, other data in the Russell Research provide a stronger indication of the baseline market and suggest that the use of 43% should be reconsidered. Specifically, including all those who identified as "Somewhat Satisfied" in the "Dissatisfied" rating should be reexamined. ILLUME argues that "Somewhat Satisfied" should be viewed as a more neutral ranking than "Dissatisfied", and including the "Somewhat Satisfied" responses when estimating the potential volume of customers to be included in the baseline adoption in the FAF market is likely over-estimating those customers who would truly have motivation to replace a FAF system with a DHP. In our view, "Somewhat Satisfied" is not a strong enough indicator of dissatisfaction to ensure replacement now or in the future.

When reviewing the cross tabs there are several alternative scenarios that need to be considered when determining the best baseline assumption.

In looking at Slide 20, figure 2 below, it shows that homeowners were asked the question, *"Have you ever considered switching?"* Of those responding, *"Yes"* (208 homes), 57% had a FAF or 118 homes. When comparing this number to the total number of FAF homes in the survey (n=252) 47% of homes with FAF have considered switching (119/252) to another technology.

Figure 2. Source of those who have considered switching have forced air heating



Home Profile of Those Have Considered Switching Heating Systems

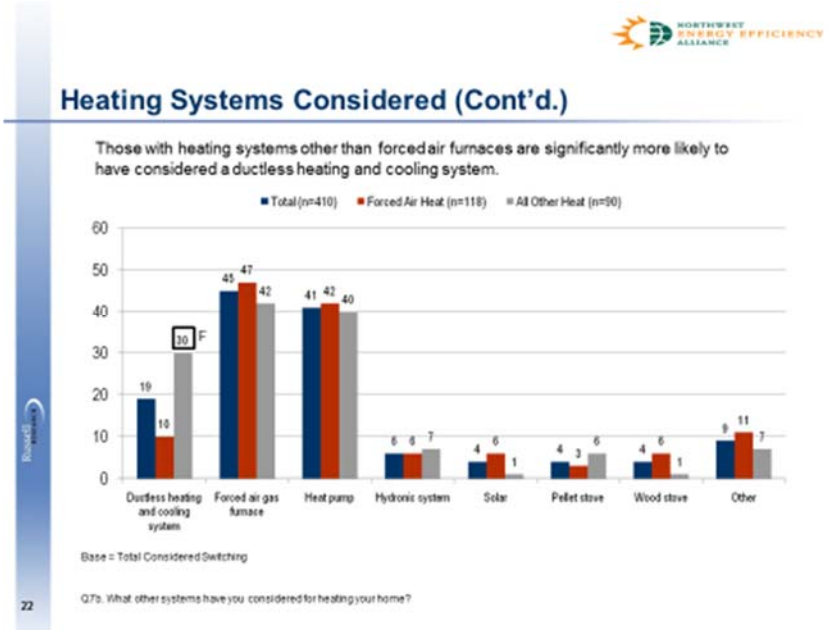
Home Characteristics	Considered Switching (208)	Never Considered Switching (202)
TYPE OF HEAT		
Electric Forced Air Heat	57	66 C
Wall Heaters	19	12
Base board Heaters	15	13
Radiant Heat	3	3
Cable Ceiling Heat	7	5
Have Central Air	26	49 C
Do not have Central Air	74 NC	51
Have window AC units	23 NC	14
Do not have window AC units	76	86 C
Have Space Heaters	51 NC	31
Do not have Space Heaters	49	69 C
Average square foot of home (Mean)	1787.3	1824.3
Average Age of Home (Mean)	33.0 NC	25.7

20

Source Russell Research 2009 *Evaluation of the Consumer Market for Ductless Heat Pumps in the Northwest*

While it might seem based on this that 47% is the appropriate number to use to determine the baseline installations, it is important to note that 47% references homeowners with FAF technology who have considered switching but is not specific to which technologies the participants would consider or whether the homeowner is truly motivated to switch technologies. Figure 3, shows that of the 118 FAF homes who have considered switching and have FAF, only 10% have considered DHP technology. This is equivalent to 12 homes, or five percent of the FAF market (12/252).

Figure 3. Customers with forced air furnaces who have considered installing a DHP



Source: Russell Research 2009 *Evaluation of the Consumer Market for Ductless Heat Pumps in the Northwest*

This result, in conjunction with other information within the Russell Research presentation, leads us to believe that a much lower percentage of existing, single family homes with electric FAF would naturally migrate to DHP technology without intervention.

Recommendation

Regional:

The maximum regional penetration estimate of 20% appears reasonable and is supported in the article, *"Trends to Watch in Ductless."* This article states that duct-free air conditioning systems experienced a 12% annual growth rate for the previous five years in the United States.

Baseline:

Strong confidence can be placed in a conservative maximum baseline penetration range of five percent - 10%, since these values are representative of target homes in which customers are currently FAF homes and are either not satisfied with electric heating and/or have considered switching to DHP technology. Additional support for this range includes:

1. Only seven percent of program participating homeowners indicated they had a FAF before installing a DHP through the program[36].

[36] Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3, Table 9

2. Just five percent of the homes with electric FAF in the Russell Research survey have considered DHP technology, those five percent can be assumed to be potential natural adopters.
3. The 2013 MPER indicates nine percent of 2013 DHP non-incented sales were to displace electric furnaces for heating in the primary living space.

Finally it should be called out that that a high adoption of DHPs in homes that are already ducted for FAF needs to be considered in the context of the technology. While homes with zonal heat have fewer options when looking to upgrade, homes with FAF can be offered a myriad of efficiency levels within the FAF market. Manufactures of this equipment continue to invest in technologies that are of increasing efficiency and that also increase the overall heating quality; this includes features like Electronically Commutated Magnetic (ECM) motors, which increase comfort and reduce energy use. In other words, DHPs have more to compete against in homes with existing FAFs.

In light of this and the other factors discussed above ILLUME recommends NEEA consider adjusting the baseline percentage for the sake of forecasting to 10%. A baseline of 10% is a slightly less conservative value than the low value of five percent, and is also the percentage of survey participants who have considered switching, currently have forced air heating, and have considered DHP technology, the most probable naturally occurring adopters. In 2013, the observed baseline value FAF was 0.47%, and while an adjustment from a 43% to a 10% maximum baseline might seem significant, it represents a more realistic growth trajectory from where the market is today.

2.4 2014 ACE MODEL KEY ASSUMPTIONS

Question: Are the identified 2014 ACE Model key assumptions appropriate?

Overview

Key assumptions in the 2014 ACE model zonal and FAF markets provided to ILLUME by NEEA include the following parameters:

1. Market Size
2. Tracked Units
3. Local Program Units
4. Baseline Units
5. Savings Rate
6. Consumer First Cost
7. Non-Electric Energy Benefit

Recommendation:

Table 2 provides the current assumptions and a summary of any recommended changes for the DHP zonal market. Further discussion about specific recommendations follow below. Note shaded items were not identified by NEEA as needing review at this time.

Table 2: 2014 DHP Zonal Key Assumptions Summary

	DHP Zonal	Recommendation
Market Size	505,066	No change
Tracked Units	12,286	NA
Local Program Units	5,132	NA
Baseline Units	2,764	No change
Savings Rate	2,867 kWh/DHP-yr	NA
Consumer First Cost	$2,788/DHP	$3,000-$4,000
Measure Life	15	No change
Non-Electric Benefit	TBD	No change
Consumer O&M Costs	NA	NA

Source: Key Assumptions and Evaluation Qs spreadsheet.

DHP Zonal Market:

1. Consumer First Cost – NEEA's assumption of a DHP first cost of $2,788 is based on CLEAResult data. In comparison, the following sources cited higher first costs:
    a) Evergreen Economics report, Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3 indicates that the average residential cost for single head, single out door head installations is approximately $4,000.
    b) NW Ductless Heat Pump Project[37] suggests an installed cost of $3,000 - $5,000.

[37] http://www.goingductless.com, accessed December 11, 2014

c) Efficiency Maine, an independent administrator for energy efficiency programs in the State of Maine[38] estimates an installed cost of $3,500.
d) Swift and Meyer, *Ductless Heat Pumps for Residential Customers in Connecticut*[39], estimate an installed cost of $3,000 - $6,000 before incentives and tax credits, and $1,400 - $3,500 after incentives and credits.

Based on information within these sources, increasing the Consumer First Cost to a range of $3,000 to $4,000, before incentives, appears reasonable. Customer First Cost should be re-evaluated as data from local installers is available.

Table 3 provides the current assumptions and a summary of any recommended changes for the DHP FAF market. Further discussion about specific recommendations follows below. Note shaded items were not identified by NEEA as needing review at this time.

Table 3: 2014 DHP FAF Key Assumptions Summary

	DHP FAF	Recommendation
Market Size	275,000	222,981
Tracked Units	TBD	NA
Local Program Units	TBD	NA
Baseline Units	TBD	NA
Savings Rate	TBD	NA
Consumer First Cost	$2,788/DHP	$3,000-$4,000
Measure Life	15	No change
Non-Electric Benefit	TBD	NA
Consumer O&M Costs	No information	NA

Source: Key Assumptions and Evaluation Qs spreadsheet.

DHP FAF Market:

[38] http://www.efficiencymaine.com/heat-pumps/, accessed December 11, 2014
[39] Ductless Heat Pumps for Residential Customers in Connecticut, Swift, R. and Meyer, R, 2010 ACEEE Summer Study on Energy Efficiency in Buildings.

1. Market Size – As mentioned in Section 2.1, update spreadsheet to reflect DHP FAF Market Size of 222,886 homes plus the 95 incented FAF homes from 2010.
2. Consumer First Cost – See DHP Zonal Consumer First Cost comments. Increasing Consumer First Cost to $3,000 appears reasonable, and this value should be re-evaluated as data from installers becomes available.

2.5 MARKET SATURATION OF 85% BY 2029 FOR EXISTING SINGLE-FAMILY HOMES WITH ZONAL HEATING SYSTEM

Question: Is a market saturation of 85 by 2029 reasonable for existing single-family homes with zonal heating systems?

Overview/Current Approach

The current market penetration model is based on 505,066 existing single-family homes with zonal heat and a target market saturation of 85% (402,948 homes) installing DHP technology by the year 2029.

Evergreen Economics' memo, *Review of Cost-Effectiveness Modeling Assumptions for the Northwest Ductless Heat Pump Project*, February 28, 2013, evaluated NEEA's initial DHP market saturation goals for the zonal market - 65% baseline adoption by 2039; and 85% regional adoption by 2029. The review concluded that a 65% baseline market share in 2039 seemed reasonable but suggested the 85% regional installation goal be adjusted further out (2033) due to the newness of the and the current, "difficult economic climate".

In order to assess the reasonableness of the NEEA forecast, the ILLUME team wanted to investigate markets that were more advanced in terms of DHP adoption. In doing so ILLUME explored overseas adoption as a comparison point. DHPs were first used in Japan during the 1970's. Since that time, the overseas market has grown and DHPs installations have achieved substantial market penetration.

Table 4: World HVAC Market Overview – DHPs

	Market Share	Number of Systems
Japan	90%	7.2M
China	86%	16.7M
Europe	81%	7.6M
United States	4%	0.4M

Source: EnergyStar.gov (http://www.energystar.gov/ia/partners/downloads/Mitsubishi-Doppel.pdf) Mitsubishi Electric, *32 Years of Leadership in Providing Unique Solutions for the HVAC Market ... and Counting*, BSRIA (Building Services Research and Information Association) report 2005/2007.

As the above table shows, after approximately 40 years of available DHP technology, the overseas market share ranges from 81% to 90%. While the underlying characteristics of the homes and market conditions, such as whether these are single family homes, whether the homes contain ductwork, or if incentives motivated installations, availability of other energy sources like natural gas, energy costs, etc., are not entirely known, this does give us some insight into the ability for the technology to become commonplace in a market.

Recommendation

The market share of overseas installations has achieved significant growth over a 40 year time period, that noted NEEA currently has a six percent market share and assuming that could grow by to a target regional zonal market saturation of 85% in just 14 years appears optimistic. NEEA should consider extending the target date another 10 years, to 2039. This recommendation is based on:

1. Insight gathered in the Message Testing study recently completed by ILLUME, *Consumer Messaging for Ductless Heat Pumps*, which found that less than one-half of customers are currently aware of DHPs (46% aware) and lack of familiarity or first-hand experience limits participants comfort with DHP technology.
2. While DHPs have been in the US market for some time their acceptance is still relatively new. Significant penetration is present but in very mature markets with over 40 years of adoption time.
3. The current regional market percentage and the significant growth it would take to expand to 85% in the next 15 years.

APPENDIX E – FINAL DEMOGRAPHICS

Table 7. Final Homeowner Survey and Non-Participant Survey Demographics

	DHP Homeowner (n=200)	Non-DHP[40] Households (n=282)
State		
Idaho/Montana	20	29
Oregon	82	109
Washington	98	144
Climate Zone		
Zone 4	142	201
Zone 5	40	59
Zone 6	18	22
Age		
18-29	-	6
25-34	12	-
30-44	-	31
35-44	19	-
45-64	66	122
65+	103	123
Household Income		
< $40k	42	80
$40-80k	84	111
$80-120k	30	36
$120k+	22	21

[40] ILLUME Advising. 2014. Consumer Messaging for Ductless Heat Pumps and Heat Pump Water Heaters. Prepared by Sara van de Grift.

Table 8. Final Installer Survey Demographics

	Master Installer (n=46)	Other Installers (n=157)
State		
Idaho/Montana	6	41
Oregon	16	57
Washington	24	59

Table 9. Participant Survey Gender by State

	Male	Female	Total
ID	60%	40%	100%
MT	70%	30%	100%
OR	51%	49%	100%
WA	55%	45%	100%
Total	55%	46%	100%

n = 200

Table 10. Participant Survey Income by State

	< $40,000	Between $40 and $60,000	Between $60 and $80,000	Between $80 and $120,000	Over $120,000	Refused	Do not know	Total
ID	40%	30%	10%	10%	0%	10%	0%	100%
MT	50%	10%	20%	10%	0%	10%	0%	100%
OR	16%	33%	18%	13%	10%	10%	0%	100%
WA	20%	19%	16%	17%	14%	11%	1%	100%
Total	21%	25%	17%	15%	11%	11%	1%	100%

n = 200

Table 11. Participant Survey Income by State

	25 to 34	35 to 44	45 to 54	55 to 64	65 and over	Total
ID	0%	0%	20%	0%	80%	100%
MT	0%	0%	10%	20%	70%	100%
OR	5%	9%	11%	22%	54%	100%

WA	8%	12%	11%	23%	45%	100%
Total	6%	10%	12%	22%	52%	100%

n = 200

Table 12. Northwest Homes with Electric Heat

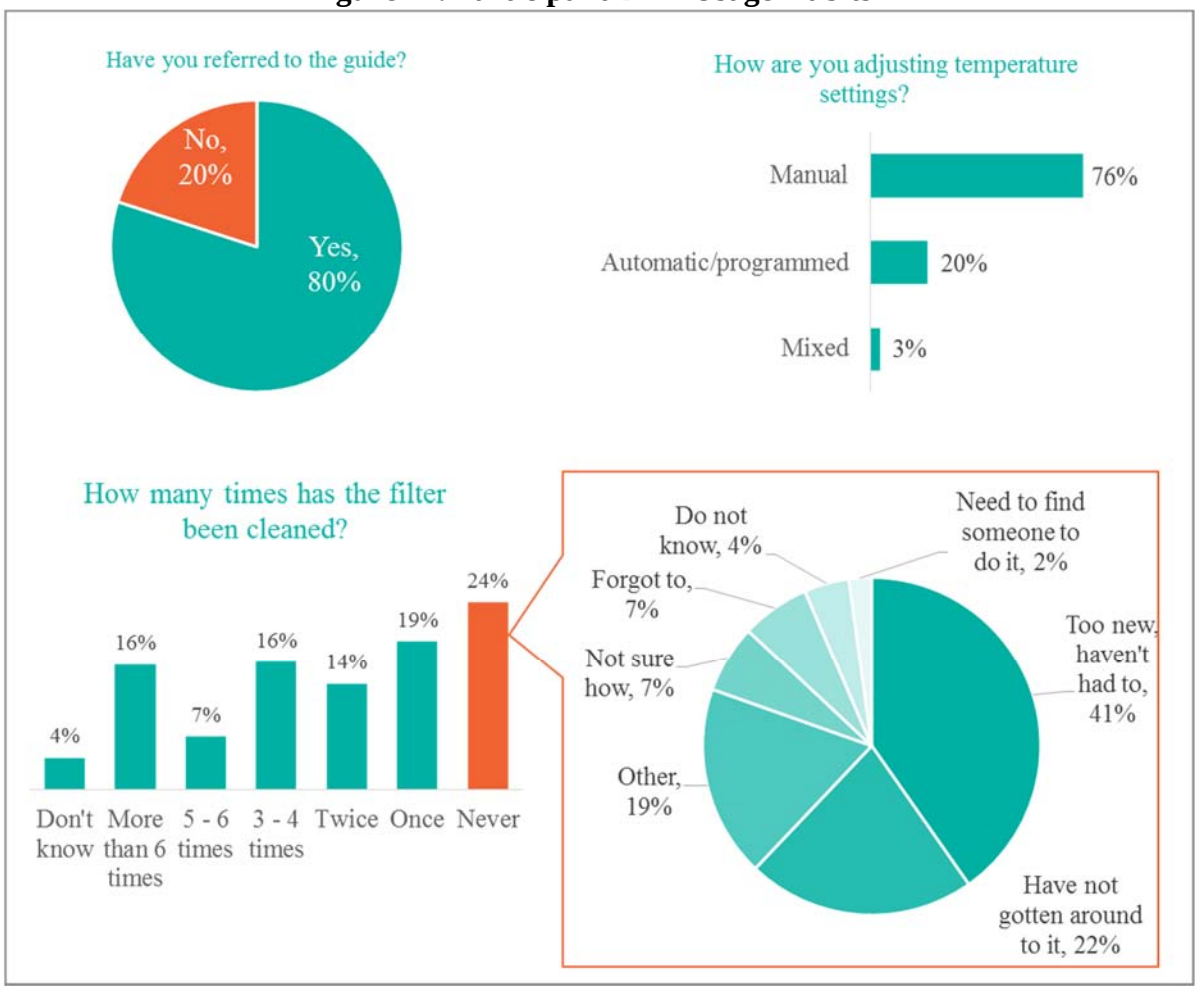
Cooling Zone, Urban/Rural	Number of Homes	Percent of Total
CZ1		
Rural	148,051	15%
Urban	483,942	50%
CZ2		
Rural	65,711	7%
Urban	121,483	13%
CZ3		
Rural	32,285	4%
Urban	107,992	11%
Total	**962,464**	**100%**

Source: Table 1 of Market Progress Evaluation Report #3[41]

[41] Evergreen Economics. 2014. Northwest Ductless Heat Pump Initiative: Market Progress Evaluation Report #3

APPENDIX F - SUPPLEMENTAL HOMEOWNER SURVEY TABLES

Figure 24. Participant DHP Usage Habits



Q. 63 Have you ever referred to the guide after the unit was initially installed? Base: Respondents who received a homeowner operations guide, n = 200.

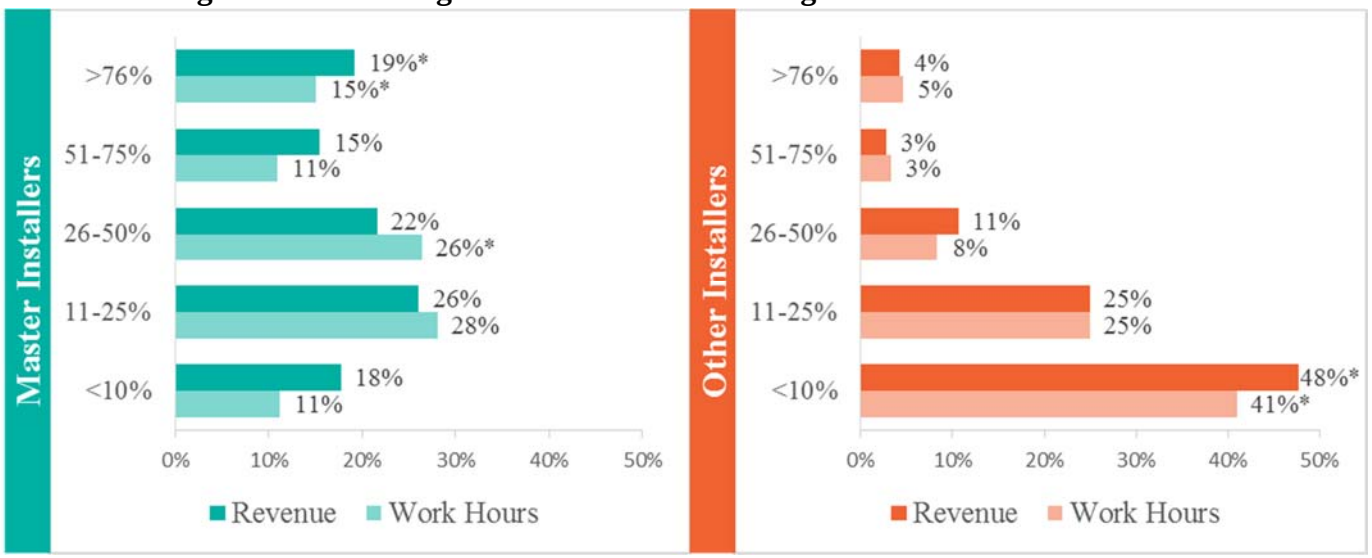
Q.64 Have you programmed your ductless heat pump to automatically adjust the temperature throughout the day, or do you usually adjust the temperature setting manually? Base: All respondents, n = 200.

Q. 60 How many times, if ever, have you or someone else cleaned the filter in your ductless heat pump? Base: All respondents, n = 200.

Q. 61 Why haven't you cleaned the filter? Base: Respondents that have not cleaned the filter, n= 48.

APPENDIX G - SUPPLEMENTAL INSTALLER SURVEY TABLES

Figure 25. Percentage of Revenue and Working Hours from DHPs



Q16c. Thinking about your business for the past year from a revenue standpoint, of the products you currently carry and install, approximately what percentage of your business is dedicated to DHPs? Your best estimate is fine.
Q16d . Thinking about your business for the past year from an working hours standpoint, approximately what percentage of your installation hours were spent selling or installing DHPs vs. other types of HVAC equipment?
Base: All respondents, Master Installers, n = 46, other installers, n = 157.

Table 13. Ductless Heat Pump Brands Offered

	Other Installers		Master Installers		All Installers	
	Currently Offer	Plan to Offer	Currently Offer	Plan to Offer	Currently Offer	Plan to Offer
Mitsubishi	78%	4%	74%	5%	77%	4%
Daikin	65%	4%	71%	7%	66%	5%
Fujitsu	39%	3%	32%	4%	38%	3%
Panasonic	7%	2%	11%	0%	8%	2%
Toshiba-Carrier	5%	2%	11%	7%	7%	3%
Lennox	9%	1%	6%	0%	8%	0%
LG	13%	2%	6%	0%	11%	1%
York	4%	1%	6%	0%	4%	0%
Sanyo	3%	1%	4%	0%	4%	1%
Friedrich	3%	1%	2%	2%	3%	1%
Quietside	0%	0%	2%	0%	0%	0%
Samsung	2%	1%	2%	0%	2%	1%
Comfort Aire	1%	0%	2%	0%	1%	0%
Other	5%	3%	2%	0%	4%	2%
Don't know	0%	1%	0%	0%	0%	0%

Q 3. Before we go on, let me first tell you that throughout this interview I'll refer to ductless heat pumps as DHPs. Which DHP brands does your firm currently offer to customers? Multiple responses allowed.
Q 4. Which brands are you planning to offer? Multiple response allowed.
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 14. Northwest Ductless Heat Pump Project Orientation Session Attendance

	Other Installers	Master Installers	All Installers
Yes	77%	98%	81%
No	13%	0%	10%
Don't know	10%	2%	9%

Q6. Has anyone at your company attended an Installer Orientation session for the Northwest Ductless Heat Pump Project? [IF NECESSARY: This could be either in person or via a webinar]
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 15. Manufacturer DHP Training Attendance

	Other Installers	Master Installers	All Installers
0 - 1	26%	2%	21%
2 - 3	37%	30%	36%
3 - 5	16%	28%	19%
5 +	21%	40%	25%

Q7. About how many of your company's staff have received manufacturer training on ductless heat pumps? (IF DK or REF, ASK:) Can you just give me your best estimate?
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 16. Plans to Send Staff to Manufacturer DHP Training

	Other Installers	Master Installers	All Installers
Yes	67%	76%	69%
No	14%	8%	13%
Don't know	19%	15%	18%

Q 8. Do you have any plans to send staff to DHP manufacturer training in the next year?
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 17. Likeliness of Attending Contractor Orientation Session

	Other Installers	Master Installers	All Installers
Not at all likely	4%	NA	4%
Not very likely	6%	NA	6%
Somewhat likely	42%	NA	42%
Very likely	15%	NA	15%
Extremely likely	23%	NA	23%
Don't know	10%	NA	10%

Q 69. (If Q 6 = NO) Earlier you said that no one from your company had attended a Contractor Orientation session on DHPs. How likely do you think it is that you will have someone attend in the next 12 months? Would you say it is:
Base: Installers that have not attended orientation session, n = 21

Table 18. Desired Support

	Other Installers	Master Installers	All Installers
Additional support from the utility	51%	63%	54%
Additional marketing materials/resources	53%	61%	55%
Additional support from manufacturers	36%	48%	39%
Additional technical service support from distributors	29%	22%	27%
Other	7%	11%	8%
None	20%	13%	18%

Q 61. Which of these other types of support, if any, would be beneficial to you? Do you need ….? Multiple responses allowed.
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 19. Main Reasons for Customer Interest

	Other Installers	Master Installers	All Installers
Energy efficiency/lower heating costs/lower energy bills	78%	98%	83%
Available rebates	61%	85%	67%
To replace existing unsatisfactory/failing equipment	40%	63%	45%
Can Heat/Cool a space not served by existing heat	53%	61%	55%
Don't need ducts/furnace/central AC	44%	59%	47%
Zonal control	44%	57%	47%
Affordability	32%	50%	36%
To add cooling (only) to a space	32%	33%	32%
Want the most current technology	15%	26%	18%
To add cooling (only) to the whole house	13%	17%	14%
Other	3%	2%	2%
Don't know	1%	2%	1%

Q 62. Based on your experience working with customers, what are the key reasons your customers are initially interested in DHPs? Multiple responses allowed.
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 20. Primary Barriers to DHP Sales Among Customers

	Other Installers	Master Installers	All Installers
Appearance	62%	88%	68%
Not visually appealing	48%	62%	51%
Cost too high	45%	36%	43%
Requires more than 1 unit	35%	46%	38%
Don't understand technology	33%	41%	35%
Effectiveness in cold weather	29%	26%	29%
Rebates unavailable	16%	22%	17%
Effectiveness (general)	12%	27%	15%
Noise	6%	13%	7%
Lack of interest (reason not stated)	7%	9%	7%
None	6%	4%	6%
Challenge to install by oneself	6%	4%	6%
Improperly installed equipment wastes energy	3%	0%	2%
Other	2%	0%	2%
Not offered by every installer	1%	2%	2%
Maintenance	1%	2%	1%
Don't know	1%	0%	1%

Q 65. Among the customers that are aware of DHPs before they meet with you, what are the primary perceived barriers to DHP sales? Multiple responses allowed.
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 21. Importance of Utility Rebates

	Other Installers	Master Installers	All Installers
Not at all important	0%	0%	0%
Not very important	3%	0%	2%
Somewhat important	18%	9%	16%
Very important	29%	22%	27%
Extremely important	47%	67%	52%
Rebates not available in my service areas	1%	2%	1%
Don't know	1%	0%	1%

Q 66. How important would you say that utility rebates are to residential DHP sales? Would you say they are:
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 22. Importance of Financing

	Other Installers	Master Installers	All Installers
Not at all important	1%	0%	1%
Not very important	17%	3%	13%
Somewhat important	31%	42%	34%
Very important	29%	25%	28%
Extremely important	18%	30%	22%
Don’t know	3%	0%	2%

Q 68. How important would you say that financing is to residential DHP sales? Would you say it is:
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 23. Perceived DHP Advantages

	Other Installers	Master Installers	All Installers
More efficient/lower operating costs than other heating/cooling types	88%	100%	90%
Ability to heat and cool	77%	95%	81%
Save energy	77%	95%	81%
Don't need furnace/central AC/ducts	79%	91%	81%
Zonal applications/can heat or cool one room	79%	84%	80%
Easy to operate	59%	84%	65%
Lower installation costs than other heating/cooling types	59%	80%	64%
Improved air quality/filtration	28%	42%	31%
Other	6%	9%	7%
Don't know	0%	0%	0%

Q 53. In your opinion, what advantages do you think DHPs offer your customers? Multiple responses allowed.
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 24. Perceived DHP Disadvantages

	Other Installers	Master Installers	All Installers
Appearance	51%	51%	51%
Hard to locate/place indoor units	32%	29%	31%
None	17%	28%	19%
Unfamiliar technology	14%	17%	15%
Cost - general	22%	17%	21%
Cost to heat/cool multiple rooms or whole home	19%	15%	18%
Are designed to heat/cool only one room	16%	15%	16%
Don't work well in cold weather	18%	13%	17%
Noise	4%	6%	5%
Other	7%	2%	6%
Don't know	1%	2%	1%

Q 54. In your opinion, what are the disadvantages of DHPs? Multiple responses allowed.
Base: All respondents, Master Installers, n= 46, other installers, n = 157.

Table 25. Responsiveness of Program Staff

	Other Installers	Master Installers	All Installers
Not at all responsive	0%	3%	1%
Not very responsive	0%	0%	0%
Somewhat responsive	12%	3%	9%
Very responsive	49%	59%	52%
Extremely responsive	36%	36%	36%
Don’t know	3%	0%	2%

Q 75. How responsive were the Program staff? Would you say they were:
Base: Installers who called NEEA DHP Program staff, Master Installers, n = 34, other installers, n = 67.

Table 26. DHP Recommendations by Application Type

	Other Installers	Master Installers	All Installers
Spaces that were previously unheated or are new additions to existing homes	93%	100%	95%
Homes with zonal electric heat	91%	96%	92%
Homes with wood heat	86%	93%	88%
Commercial spaces	82%	90%	84%
Manufactured homes	75%	87%	77%
Homes with oil heat	73%	85%	76%
Multifamily homes	71%	83%	74%
Newly constructed homes	65%	81%	69%
Homes with gas heat	67%	80%	70%
Other	6%	11%	8%

Q 49. Which of the following applications have you recommended a DHP for?
Base: Installers who called NEEA DHP Program staff, Master Installers, n = 34, other installers, n = 67.

APPENDIX H – SURVEY INSTRUMENTS/INTERVIEW GUIDES

A.1 PARTICIPANT SURVEY

Key Research Questions:

	Participants
1	Where and how did DHP owners learn about the Initiative and DHPs?
2	What was the most influential factor in making a decision to install a DHP (e.g. rebates, type of messaging, recommendation from a friend, installer, utility, etc.)?
3	What was the timing of replacement (early vs. emergency) and duration of research/pre-contemplation process?
4	What is DHP owner satisfaction with their DHP? What are perceived barriers or concerns with the technology?
5	What were the pre-installation conditions (heat source)?
6	Demographics of DHP owners

Target Audience: 200 DHP owners in Q3 2013- Q1 2014 from CLEAResult's database.

Hello, my name is _____ calling from Leede Research on behalf of the Northwest Energy Efficiency Alliance, or NEEA.

(Read if Necessary) NEEA is a non-profit organization that works to accelerate the innovation and adoption of energy -efficient products, services and practices in the Northwest region. NEEA is supported by, and works in collaboration with, the Bonneville Power Administration and over 100 Northwest utilities on behalf of more than 12 million energy consumers.

May I speak to_____? (REPEAT INTRO BEFORE CONTINUING IF NEW PERSON COMES TO THE PHONE) I am calling today because our records indicate that you installed a Ductless Heat Pump in the past year and we're conducting an evaluation of the Northwest Ductless Heat Pump Project. They'd like to get your feedback on ductless heat pumps and use your experiences to help improve the program. Is now a good time?

SCREENER:

SCREEN1: NOT USED

SCREEN2: NOT USED

SCREEN3: Our records indicate that you installed a ductless heat pump in your home in 2013 or 2014. Is this correct?

IF NOT SURE: A ductless heat pump is a type of home heating and cooling system. It is sometimes called a "mini-split" system. It's unique in a couple of ways. First, it does not require the use of air ducts, like more common heating and cooling systems. Ductless heat pumps have an outdoor compressor unit and one or more indoor air-handling units, called "heads", linked by a refrigerant line. Indoor heads are typically mounted high on an indoor wall or ceiling. If multiple indoor heads are installed, each head serves a different heating and cooling zone that can be controlled independently. Ductless heat pumps are often used to displace electric resistance heating like electric forced air furnaces, baseboards, wall or ceiling units, as well as woodstoves and other space heaters.

1)	Yes – unaided	[CONTINUE]
2)	Yes – aided	[CONTINUE]
3)	No	[TERMINATE]
88)	Refused	[TERMINATE]
99)	Don't know	[TERMINATE]

SCREEN4: Do you own your home, or do you rent it?

1)	Own	[CONTINUE]
2)	Rent	[TERMINATE]
88)	Refused	[TERMINATE]
99)	Don't know	[TERMINATE]

SCREEN 5: Do you live in this home at least 10 months out of the year?

1) Yes [CONTINUE]
2) No [TERMINATE]
88) Refused [TERMINATE]
99) Don't Know [TERMINATE]

Terminate: Thank you for your time. Based on your response we do not need you to complete this survey at this time. Thank you for your time and consideration. Good-bye.

Awareness Battery

Q1. (NOT USED)

Q2. (NOT USED)

Q3. How did you first hear about ductless heat pumps? [DO NOT READ CHOICES; CHOOSE ONE, THE FIRST PLACE THEY HEARD OF IT. IF "UTILITY" OR "NEWSPAPER," BE SURE TO PROBE FOR WHICH OF THE UTILITY OR NEWPAPER CHOICES BELOW]

1) Friend or acquaintance had one
2) Utility print advertising, bill stuffer
3) Utility website
4) Utility marketing display
5) Newspaper ad
6) Newspaper story
16) Home show
7) Television ad
8) Social media
9) Materials or information from contractor/installer
10) Internet research
11) Internet advertising
12) Retail store display or promotion
13) Saw one installed or used one in foreign country
14) There is one in my home – someone else installed it (TERMINATE)
15) Direct mail
17) Home improvement television show
18) At my job
19) Other customers' reviews and ratings
20) The brand name or manufacturer of the equipment
21) Local celebrity
22) Advice of a sales person

77) Other (SPECIFY): _____

Q4. Did you hear about it anywhere else? (IF NEEDED: Or learn more about it from another source?) (DO NOT READ CHOICES, ACCEPT MULTIPLES. IF "UTILITY" OR "NEWSPAPER," BE SURE TO PROBE FOR WHICH OF THE UTILITY OR NEWPAPER CHOICES BELOW)

1) Friend or acquaintance had one
2) Utility print advertising, bill stuffer
3) Utility website
4) Utility display
5) Newspaper ad
6) Newspaper story
16) Home Show
7) Television ad
8) Social media
9) Materials from contractor/installer
10) Internet research
11) Internet advertising

12) Retailer display or promotion
13) Saw one installed or used one in foreign country
14) There is one in my home – someone else installed it (TERMINATE)
15) Direct mail
17) Home improvement television show
18) At my job
19) Other customers' reviews and ratings
20) The brand name or manufacturer of the equipment
21) Local celebrity
22) Advice of a sales person
77) Other (SPECIFY): _____

Q5. NOT USED

Q6. NOT USED

Q7. NOT USED

Q8. Which information sources, including the one(s) you just mentioned, were especially important in your decision to install the ductless heat pump? (DO NOT READ, RECORD FIRST 2 MENTIONED)

PROGRAMMER NOTE: ADD INFLUENTIAL SOURCES MENTIONED BELOW TO Q4 IF NOT ALREADY RECORDED FOR Q3 OR Q4.

1) Friend or acquaintance had one
2) Utility print advertising, bill stuffer
3) Utility website
4) Utility display
5) Newspaper ad
6) Newspaper story
16) Home Show
7) Television ad
8) Social media
9) Materials or information from contractor/installer
10) Internet research
11) Internet advertising
12) Retailer display or promotion
13) Seeing/using one in foreign country
14) There is one in my home – someone else installed it (TERMINATE)
15) Direct mail
17) Home improvement television show
18) At my job

19) Other customers' reviews and ratings
20) The brand name or manufacturer of the equipment
21) Local celebrity
22) Advice of a sales person
23) (READ IN Q3 Open Response)
24) (READ IN Q4 Open Response)
25) Other

Q9. NOT USED

Q10. NOT USED

Q11. NOT USED

Q12. NOT USED

Q13. NOT USED

Q14. NOT USED

Q15. NOT USED

Q16. NOT USED

Q17. NOT USED

Q 18. NOT USED

Q19. NOT USED

Q20. NOT USED

Q21. NOT USED

Q22. NOT USED

Q23. NOT USED

Q24. NOT USED

Q25. NOT USED

Q26. NOT USED

Q27. NOT USED

Q28. NOT USED

Q29. NOT USED

Q30. How often do you review your electric bill? Would you say it is:

1) Each month (IF NEEDED: most months)
2) Every couple of months
3) Quarterly
4) Twice each year
5) Once a year
6) Never
77) Other (specify)
99) Don't know
88) Refused

Q 31. What heating and cooling source(s) do you have in your home? [DO NOT READ LIST UNLESS NECESSARY; DO NOT LIST "FANS"; CHECK ALL THAT APPLY AND ANNOTATE "HEAT" OR "COOL" UNDER COLUMN A—PROBE "ANYTHING ELSE?"; THEN, IF NECESSARY, GET A FUEL TYPE (COLUMN B) FOR EACH TYPE OF HEAT/COOLING MENTIONED; IF COLUMN A = "HEAT" THEN ASK C, IF COLUMN A = COOL, THEN ASK D.)

Q31a. What type of heat does your home have? (Take all mentioned)

a. Forced air furnace
b. Baseboards
c. Wall heaters
d. Electric radiant heat
e. Wood heat

f. Ductless heat pump
g. Space heaters
h. Kerosene or oil
i. Propane
j. Heat pump, not ductless
o. None
p. Other

31b. What type of fuel does your heating system use? (Pick fuel for each item mentioned)

a. Electricity
b. Propane
c. Kerosene
d. Oil
e. Natural Gas
f. Wood
g. Other: (Please Specify)

31c. Which is your home's primary heating system? (If only 1 response in 31a.skip to 31d.)

a. Forced air furnace
b. Baseboards
c. Wall heaters
d. Electric radiant heat
e. Wood heat
f. Ductless heat pump
g. Space heaters
h. Kerosene or oil
i. Propane
j. Heat pump, not ductless
o. None
p. Other

31d. What type of cooling does your home have? (Accept all mentioned)

k. Central/whole house AC
l. Window air conditioner
m. Portable air conditioner (not fan)
n. Evaporative/swamp cooler

o. None
p. Other

31e. **Which is your home's primary cooling system? (If only 1 response in 31d please skip to Q32)**

k. Central/whole house AC
l. Window air conditioner
m. Portable air conditioner (not fan)
n. Evaporative/swamp cooler
o. None
p. Other

Motivations Battery

Now, I would like to ask you some questions about your reasons for purchasing a ductless heat pump.

Q32. What initially interested you in the ductless heat pump? [DO NOT READ, PROBE TO CODE, CHECK ALL THAT APPLY]

1) Needed heating/AC, had no ducts
2) Needed additional or supplemental heating/AC
3) Existing heating was not working well enough
4) Existing heating was broken
5) Wanted to add cooling
6) Wanted to be more energy efficient
7) Wanted to save money
8) Not comfortable in home/wanted to improve home comfort
9) Other, (please specify)_____

Q33. Please rate how important each of the following factors was in your decision to purchase a ductless heat pump, were 1 is not at all important, and 10 is very important:

How important was…	1	2	3	4	5	6	7	8	9	10
a. The potential for more comfort offered by the ductless heat pump										
b. The cost of the ductless heat pump, including any incentives or rebates										
c. The potentially cheaper operating costs of the ductless heat pump compared to your previous heating/cooling system										
d. The cooling capability of the ductless heat pump										

e. The ability to install heating or cooling equipment without needing to install ducts										
f. The ability to heat or cool different areas of the house independently										
g. The smaller size compared to other primary heating systems										
h. The up to two times greater energy efficiency of other primary heating systems										
i. The ability to have more direct user control over temperature										
j. The potential to save 25% - 50% on your energy bills										
k. The reduction in indoor air pollution										
l. The increased durability and longer life compared to other primary heating systems										
m. The increased safety compared to some other types of heating										
n. The easier installation compared to standard primary heating systems										
o. The "smart" or advanced technology offered by DHPs										

Q34. NOT USED

Q35. How did you gather information about the ductless heat pump before you made your purchase? [DO NOT READ; CHECK ALL THAT APPLY]

1) Internet/online
2) Contractor provided materials
3) Spoke to the contractor
4) Spoke to someone who already had a **ductless heat pump** installed
5) Did not look for any information
6) Utility provided information
7) Other customer reviews
8) Home Show
9) Retail store salesperson
10) Talk to friends and/or neighbors
11) Other, please specify: _____

Q36. Was there anything you were concerned about when you were considering a ductless heat pump? [DO NOT READ; CHECK ALL THAT APPLY]

1) No concerns (DO NOT ASK Q37 FOR THIS ITEM)

2) Appearance
3) Capability/functionality – general
4) Capability/functionality – cold weather
5) Cost (DO NOT ASK Q37 FOR THIS ITEM)
6) Noise
7) Maintenance needs
8) Equipment warranty
9) Manufacturer customer service/support
10) Expense
11) Challenge to install yourself
12) Are not offered by every contractor
13) Are an unfamiliar technology
14) Improperly installed equipment may waste energy
15) Other, please specify:_____

Q37. [ASK FOR EACH ITEM MENTIONED IN Q36:] Now that you have it installed, is (Q36 ANSWER) a problem?_____

Yes
No
DK/NA

Q37a. (If Yes) What problem do you have?
(Open Response)

Q38. What was the amount of the rebate or incentive you received <u>from your local utility</u>? Your best guess is fine. (NOTE: WE'RE ONLY INTERESTED IN REBATES/INCENTIVES *FROM THEIR LOCAL UTILITY*, <u>NOT</u> REBATES/INCENTIVES/TAX CREDITS FROM OTHER SOURCES.)
Record REBATE _____ [77=Didn't receive rebate; Don't Know = 99, Refused = 88]

Q39. (IF Q38=88888, SAY:) Would you say it was:
1) Under $500
2) $500 to $1000, or
3) More than $1000
99) Don't know)
88. (Refused)

Q40. [SKIP IF Q38=77777,99999 OR Q39=88,99] How important was the rebate you received to your decision to purchase the ductless heat pump? Would you say it was:
5) Extremely important

4) Very important
3) Neither important or unimportant
2) Not very important
88. 1) Not at all important (Don't know)
99. (Don't Know)
88. (Refused)

Q41. Did you finance your DHP through any of the following sources?
[READ 1-3, ALLOW MULTIPLES]

1) Local bank or credit union
2) Utility company
3) Installation contractor
4) Other, specify _____
5) (No, did not use a loan)
99. (Don't Know)
88. (Refused)

Q42. Whose idea was it to install a ductless heat pump – someone in your home, a contractor, or someone else?

1) Someone in home
2) Contractor
3) Other: _____
4) Don't know

Q43.) How many different installation contractors did you get cost estimates from?

1) 1
2) 2
3) 3
4) 4
5) More than 4
6) Installed it myself (skip to 44a)
7) Installation arranged & paid for by another party/program (skip to 44a)
8) Don't know
9) Refused

Q44. What were the main reasons you chose the installation contractor you did? (DO NOT READ, ACCEPT MULTIPLES)

1) Offered the lowest cost
2) Offered an acceptable cost
3) They were very experienced with DHPs
4) Have used contractor before/satisfied with past work
5) Liked their presentation/customer service
6) Are local/close by
7) Could install DHP quickly
8) Are on goingductless.com website
9) Are on utility list of preferred contractors

10) Trust the contractor
11) Good company reputation
12) They were the only company that carries DHPs
13) Other
14) Don't know

Q44a. What were the main reasons you chose to do the install yourself or why the install was arranged & paid for by another party/program? (DO NOT READ, ACCEPT MULTIPLES)

(Open Response, Accept Multiple answers)

Q44b. On a scale of one to 10, where one is "very easy" and ten is "very difficult," how would you describe the process of installing a DHP in your home?

Very Easy								Very Difficult	
1	2	3	4	5	6	7	8	9	10

Q45. What heat sources did you have before you installed the ductless heat pump? [DO NOT READ LIST UNLESS NECESSARY; CHECK ALL THAT APPLY—PROBE "ANYTHING ELSE?"; IF APPROPRIATE, GET FUEL (B) FOR EACH HEAT TYPE; DO ASK C FOR EACH HEAT TYPE IN "A." ITEMS D AND E ARE BOTH ONE ANSWER ONLY)

Q45 a. What type of heat did your home have? (Take all mentioned)

- **a. Forced air furnace**
- **b. Baseboards**
- **c. Wall heaters**
- **d. Electric radiant heat**
- **e. Wood heat**
- **f. Ductless heat pump**
- **g. Space heaters**
- **h. Kerosene or oil**
- **i. Propane**
- **j. Heat pump, not ductless**
- **o. None**
- **p. Other**

Q45b. What type of fuel did your heating system use? (Pick fuel for each item mentioned)

- **a. Electricity**
- **b. Propane**
- **c. Kerosene**
- **d. Oil**

e. Natural Gas
f. Wood
g. Other: (Please Specify)

Q45c. Do you still use that heating system?
Yes
No
DK/NA

Q45d. Which is your home's primary heating system now?
a. Forced air furnace
b. Baseboards
c. Wall heaters
d. Electric radiant heat
e. Wood heat
f. Ductless heat pump
g. Space heaters
h. Kerosene or oil
i. Propane
j. Heat pump, not ductless
o. None
p. Other

Q46. NOT USED

Q47. Did you have any cooling equipment before you purchased the ductless heat pump?

01 Yes
02 No
03 Don't know

Q47a. (ASK IF Q47=01) What kind of cooling equipment did you have? [DO NOT READ; CHECK ALL THAT APPLY; DON'T RECORD "FANS."]
1) None
2) Window/Room AC
3) Central/Full house AC
4) Portable AC (and not Window AC)
5) Evaporative/Swamp cooler
6) Other:_____

Q48. [IF Q47 > 1] Do you still use this other cooling equipment? (For each **Q47** record)

1) Yes
2) No
3) Don't Know

Q49. Since you purchased the ductless heat pump, have you purchased any additional heating or cooling equipment (If needed: space heaters, window ACs)? This would include additional indoor ductless heat pump room units added after your original installation.

1) Yes
2) No
3) Don't Know

Q50. (If Q49 = YES) What did you purchase? [DO NOT READ; CHECK ALL THAT APPLY]

1) Furnace
2) Baseboard heating
3) Wall heaters
4) Electric radiant heat
5) Space heater
6) Wood heat
7) Kerosene or oil heat
8) Central/full house AC
9) Window AC
10) Portable AC
11) Evaporative/Swamp cooler
12) **ductless heat pump** – heating and cooling
13) **ductless heat pump** – cooling only
14) Other (SPECIFY)_____
15) Don't know

DHP Experience Battery

Next, I'd like to ask about your experiences using your ductless heat pump.

Q51. We understand that you had [# Indoor Units – from sample data] ductless heat pumps installed inside your house. Is this correct?

1) Yes
2) No
3) Don't know

Q52_1. (If Q51 = NO) How many ductless heat pump units do you have installed inside your house?

_____

Q52_2. In which room in your house is that/each of those unit(s) installed? (READ ROOMS IF NECESSARY) (CHECK ALL THAT APPLY)

1) Kitchen (with or without dining area)
2) Dining room (formal)
3) Family room
4) A Bathroom
5) A Bedroom
6) Office or study
7) Entertainment or rec room
8) Garage
9) Detached living unit (e.g., "accessory " or "grandparents unit")
10) Basement
11) Living Room

Q53. NOT USED

Q54. Since it was installed, have you used the ductless heat pump for: (READ CHOICES)

1) Heating
2) Cooling, or
3) Both

Q55. Has the ductless heat pump ever been unable to meet your heating or cooling needs?

1) Yes, heating
2) Yes, cooling
3) Yes, both
4) No

Q55a. (IF Q55= 1,2 or 3) Please describe the problems you have experienced.

(RECORD DETAILS) _____

Q56. NOT USED

Q57. When you purchased your ductless heat pump, what was the coldest outside air temperature you expected it to perform well at?

Record COLDEST TEMP in Fahrenheit degrees _____, or 99. Don't know/had no expectation

Q58. (IF COLDEST TEMP GIVEN) And where did you get that information? (DO NOT READ, ALLOW MULTIPLES)

1) Manufacturer product literature/owner's manual
2) Print information from installer (not produced by manufacturer)
3) Conversation with installer
4) Information from utility
5) Information from retail store
6) Experience of friends or family
7) Internet information
8) Other; Specify_____
9) Don't know

Q59. NOT USED

Q60. How many times, if ever, have you or someone else cleaned the filter in your ductless heat pump?

1) Never cleaned
2) Once
3) Twice
4) 3 times
5) 4 times
6) 5 times
7) 6 times
8) More than 6 times
9) Other (SPECIFY)_____
10) Don't know

Q61. (If Q60 = 1) Why haven't you cleaned the filter? (DO NOT READ, ACCEPT MULTIPLES)

1) It's too new, haven't had to yet
2) Not sure how
3) Too difficult
4) Just haven't gotten around to it
5) Forgot to
6) Need to find someone to do it
7) Other; specify _____
8) Don't know

Q62. Did you receive a homeowner operations guide for the ductless heat pump that was installed?

1) Yes
2) No
3) Don't know

Q63. (IF Q62 = YES) Have you ever referred to the guide after the unit was initially installed?

1) Yes
2) No
3) Don't know

Q64. Have you programmed your ductless heat pump to automatically adjust the temperature throughout the day, or do you usually adjust the temperature setting manually?

1) Manual
2) Automatic/programmed
3) Mixed
4) Don't know

Q65. (IF Q64 = AUTOMATIC) To maximize energy savings, some people program their ductless heat pump to be the primary source of heating or cooling so there is no overlap at all with any other heating or cooling equipment in the house. Have you done this in your house?

1) Yes
2) No
3) Don't know

Satisfaction Battery

Q66. Please rate your satisfaction with the following aspects on a 5-point scale, where 1 means "very dissatisfied" and 5 means "very satisfied":

How satisfied are you with ….	1	2	3	4	5	DK
A. the sound level of the indoor unit	1	2	3	4	5	9
B. your electricity bill since installing the ductless heat pump	1	2	3	4	5	9
C. the heating	1	2	3	4	5	9
D. the cooling	1	2	3	4	5	9
E. the maintenance required	1	2	3	4	5	9
F. the appearance of the indoor unit	1	2	3	4	5	9
G. And what is your overall satisfaction rating?	1	2	3	4	5	9

Q67. Some people say that after a while they no longer even notice the ductless heat pump unit on their wall. Is this true for you?

1) Yes
2) No
3) Don't know

Q68. (IF Q67 = YES) How long after you installed it would you say you stopped noticing it, in terms of days, weeks or months?

Record answer: _____
99) Don't Know

Q69. NOT USED

Q69a. What do you consider to be the top three benefits of your DHP, other than energy savings? (DO NOT READ)

1 Increased comfort
2 improved air quality
3 quiet operation
4 reliable operation
5 safe to use (as in no more fire hazards)
6 better for the environment
7 easy to use
8 Other (specify)_____

Q70. Have you, or would you, recommend the ductless heat pump to a friend, colleague or family member?

1) Yes, have recommended
2) I have not yet, but would recommend
3) No, I would not recommend
4) Don't know

Q71. [IF Q70 = 1 or 2] What are some of the reasons you recommend it? (DO NOT READ, ACCEPT MULTIPLES)

1) Lower energy bills
9. Energy efficiency
10. It's quiet
2) Improved heating comfort
3) Improved cooling comfort
4) Equipment cost is reasonable
5) Appearance is good/acceptable
6) Good for the environment
7) Operates reliably
8) Requires little maintenance
77) Other, please specify:_____

Q72. Thinking back over the entire experience with your DHP and the buying process - is there anything you would change?

1. Yes (SPECIFY)_____
2. No

Demographics Battery

The following questions are for classification purposes only. All your answers will be kept confidential.

Q73. How important is it for you to have an energy-efficient home? Would you say it is: (READ LIST)?

4) Very important
3) Somewhat important
2) A little important
1) Not at all important
99) Don't know

Q74. NOT USED

Q75. I'm going to read a list of energy efficient equipment you may have in your home. For each item, please tell me if you've installed this type of equipment within the last two years. In the last two years, have you installed any….? (READ EACH ITEM AND GET A "YES" OR "NO" BEFORE READING THE NEXT ITEM; ACCEPT MULTIPLES)

1. Compact fluorescent lights, or CFLs
2. Efficient fluorescent tube lighting such as T8s or T5s
3. LED lighting
4. Insulation
5. An energy efficient water heater
6. An energy efficient clothes washer
7. An energy efficient clothes dryer
8. An energy efficient refrigerator or freezer
9. An energy efficient dishwasher
10. An energy efficient furnace

Q76. Now I'd like you to think about how quickly you, personally, adopt new technology. Which of the following do you think best describes you? (READ; ONE ANSWER ONLY?)

1) I am the first among my friends to purchase new technology
2) I purchase new technology sooner than most of my friends
3) I am typically in the middle of the group when purchasing new technology
4) I purchase new technology after most of my friends have purchased it
5) I am one of the last people to purchase new technology
8. Don't know
9. Refused

Q77. What year was your home built?

ENTER HOMEYEAR: _____

If not sure, would you say:

1) 2006 or later
2) 2000 - 2005
3) 1990 - 1999
4) 1980 - 1989
5) 1970 – 1979
6) 1960 - 1969
7) earlier than 1960
88) Refused
99) Don't know

Q78. Not Used

Q79. Which of the following best describes your age range? (READ LIST)

1) 18 to 24
2) 25 to 34
3) 35 to 44
4) 45 to 54
5) 55 to 64
6) 65 and over
88) Refused
99) Don't know

Q80. Which of the following best describes your educational background?

1) Less than high school
2) High school or GED
3) Some college
4) Technical College (2 year degree)
5) 4 Year college
6) Graduate degree
88) Refused
99) Don't know

Q81. Which of the following categories best represents your approximate annual household income from all sources in 2014, before taxes?

1) < 40,000
2) Between 40 and 60,000
3) Between 60 and 80,000
4) Between 80 and 120,000
5) Over 120,000
88) Refused

99) Don’t know

Q82. Which of the following ethnicities would you say describe you? Please tell me all that apply. (READ ALL, ACCEPT MULTIPLES)

1) White
2) Black or African American
3) American Indian or Alaska Native
4) Asian
5) Native Hawaiian or Other Pacific Islander
6) Hispanic or Latino
7) Other, Specify_____

88) Refused
99) Don’t know

Q83. For verification purposes only, may I have your name?

1) Name: _____

88) Refused
99) Don’t know

Q84. [Interviewer: Record Gender.]

1) Male
2) Female

99) Don’t know

Those are all the questions I have for you. Thank you very much for your time and sharing this information!

A.2 INSTALLER SURVEY

Key Research Questions:

Master Installers	
1	When did installers begin offering DHPs as a part of their business' product mix and why? How many types of DHPs do they currently offer? What percentage of their business is dedicated to DHP vs. other technologies?
2	How has the program been valuable to installers' businesses? Are there ways in which the program could assist in making DHPs a more viable product option? Are installers aware of the work NEEA is doing with manufacturers and distributors to promote DHPs?
3	How do installers market and promote DHPs? Do they use NEEA messaging/marketing pieces?
4	What is customers' awareness and perception of DHPs? How do customers benefit from DHPs? How do installers benefit from the program?
5	How satisfied are installers with the DHP program?
6	How are costs changing for DHP's? What are the most common installation configurations, manufacturer/brand installed?
7	How have installations changed since the launch of the Initiative ? Has the market shifted in the way predicted during the last market progress evaluation if yes, what is the primary cause for that shift, if no, what was the barrier?
8	How will the market change in the next two years, the next five years?
All Other Installers	
1	Do installers offer DHPs as a part of their business' product mix? Why/why not? How many types of DHPs do they offer? What percentage of their business is dedicated to DHP vs other technologies?
2	What challenges do the installers face in offering DHPs to their customers? Do customers request this information? How could challenges be overcome?
3	Are installers, broadly, aware of NEEA's DHP program?
4	What is installer perception of demand? Do installers need training?

Target Audience: 40 Master HVAC contractors, and 180 other HVAC contractors

INTRODUCTION:

INTRO:

Hi, my name is _____ calling from LEEDE Research on behalf of the Northwest Energy Efficiency Alliance, also known as NEEA (KNEE-AH) – and the Northwest Ductless Heat Pump Project. The DHP Project is working to support businesses that sell DHPs by providing incentives, including customer rebates, targeting at growing the market for the technology. We're calling businesses that have been involved with the program in the past to gain insight into their experiences.

I would like to talk with a sales manager or the person who is most knowledgeable about your firm's sales of residential HVAC equipment, especially ductless heat pumps. Who would I need to speak with? *GET REFERRAL TO CORRECT PERSON.* _____

1 CORRECT PERSON IS AVAILABLE (CONTINUE)
2 CORRECT PERSON **IS NOT** AVAILABLE (SCHEDULE CALL BACK)

ALL, when right person is on the line:

INTRO2:
Hi, my name is _____ calling from LEEDE Research on behalf of the NEEA (KNEE-AH). NEEA is conducting an evaluation of the Northwest Ductless Heat Pump Project. The DHP Project is working to support businesses that sell DHPs by providing incentives, including customer rebates, targeting at growing the market for the technology. We're calling businesses that have been involved with the program in the past to gain insight into their experiences. I would like to ask about your firm's experiences with ductless heat pumps. Is this a good time? *[IF ASKED: TELL RESPONDENT IT WILL TAKE ABOUT 15 MINUTES DEPENDING ON THEIR ANSWERS]*

1 YES (CONTINUE)
2 NO (SCHEDULE CALL BACK)
9 REFUSED (THANK AND TERMINATE, RECORD AS RF.INTRO3)

INSTALLER BACKGROUND

Q 1. Does your company actually install ductless heat pumps, also known as DHPs or mini-splits, or do you just supply them for others to install?

1 YES, DO INSTALLS (CONTINUE)
2 NO, DO NOT INSTALL (THANK AND TERMINATE, RECORD AS NQ.Q1)
8 DON'T KNOW (THANK AND TERMINATE, RECORD AS DK.Q1)
9 REFUSED (THANK AND TERMINATE, RECORD AS RF.Q1)

Q 2. Most of the electric utilities in this region offer incentives for qualifying residential ductless heat pumps and participate in the Northwest Ductless Heat Pump Project. Are

you familiar with this Initiative?

1 YES
2 NO
8 DON'T KNOW

Q 3. Before we go on, let me first tell you that throughout this interview I'll refer to ductless heat pumps as DHPs. Which DHP brands does your firm currently offer to customers? (DO NOT READ LIST, ACCEPT MULTIPLE ANSWERS)

01 COMFORT AIRE
02 DAIKIN
03 FRIEDRICH
04 FUJITSU
05 LENNOX
06 LG
07 MITSUBISHI
08 PANASONIC
09 QUIETSIDE
10 SAMSUNG
11 SANYO
12 TOSHIBA-CARRIER
13 YORK
77 OTHER (SPECIFY):
_____
88 DON'T KNOW
99 REFUSED

[SKIP IF Q3=88,99]
Q 4. Are you planning to offer any other DHP brands in the next 12 months?

1) Yes
2) No
3) **DK/NA**

(IF YES:) Which brands are you planning to offer? (DO NOT READ LIST, ACCEPT MULTIPLE ANSWERS)

01 COMFORT AIRE
02 DAIKIN
03 FRIEDRICH
04 FUJITSU
05 LENNOX
06 LG
07 MITSUBISHI
08 PANASONIC
09 QUIETSIDE

10 SAMSUNG
11 SANYO
12 TOSHIBA-CARRIER
13 YORK
77 OTHER (SPECIFY):
_____
88 DON'T KNOW
99 REFUSED

Q 5. How many people are employed by your firm at this, your current, location?

[ONLY IF NEEDED:] Please count part time staff as .5. [BEFORE ACCEPTING A DON'T KNOW/REFUSED ASK FOR THE RESPONDENT'S BEST ESTIMATE. ROUND UP TO WHOLE NUMBER]

_____ 88888=DK 9999=REFUSED

Q 6. Has anyone at your company attended an Installer Orientation session for the Northwest Ductless Heat Pump Project? [IF NECESSARY: This could be either in person or via a webinar]

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 7. About how many of your company's staff have received manufacturer training on ductless heat pumps? (IF DK or REF, ASK:) Can you just give me your best estimate?

_____ 8888=DON'T KNOW9999=REFUSED

Q 8. Do you have any plans to send staff to DHP manufacturer training in the next year?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 9. In what states does your firm install residential HVAC equipment? [MARK all that apply]

1 Washington

2 Oregon
3 Idaho
4 Montana
8 DON’T KNOW (SKIP TO Q 16a)
9 REFUSED (SKIP TO Q 16a)

Q 10. [IF Q 9 =1 ASK:] In which Washington counties do you do the majority of your residential HVAC work? (DO NOT READ, ACCEPT UP TO FIVE, PROMPT FOR TOP FIVE IF WORKING IN MANY AREAS) (IF RESPONDENT DOES NOT KNOW COUNTIES, PROMPT FOR CITIES and write in OTHER)

53001 ADAMS COUNTY

53003 ASOTIN COUNTY

53005 BENTON COUNTY

53007 CHELAN COUNTY

53009 CLALLAM COUNTY

53011 CLARK COUNTY

53013 COLUMBIA COUNTY

53015 COWLITZ COUNTY

53017 DOUGLAS COUNTY

53019 FERRY COUNTY

53021 FRANKLIN COUNTY

53023 GARFIELD COUNTY

53025 GRANT COUNTY

53027 GRAYS HARBOR COUNTY

53029 ISLAND COUNTY

53031 JEFFERSON COUNTY

53033 KING COUNTY

53035 KITSAP COUNTY

53037 KITTITAS COUNTY

53039 KLICKITAT COUNTY

53041 LEWIS COUNTY

53043 LINCOLN COUNTY

53045 MASON COUNTY

53047 OKANOGAN COUNTY

53049 PACIFIC COUNTY

53051 PEND OREILLE COUNTY

53053 PIERCE COUNTY

53055 SAN JUAN COUNTY

53057 SKAGIT COUNTY

53059 SKAMANIA COUNTY

53061 SNOHOMISH COUNTY

53063 SPOKANE COUNTY

53065 STEVENS COUNTY

53067 THURSTON COUNTY

53069 WAHKIAKUM COUNTY

53071 WALLA WALLA COUNTY

53073 WHATCOM COUNTY

53075 WHITMAN COUNTY

53077 YAKIMA COUNTY

77777 OTHER (SPECIFY) (Prompt for cities or regions (around cities) if respondent does not know counties)

88888 DON'T KNOW

99999 REFUSED

Q 11. [IF Q 9 =2 ASK:] In which Oregon counties do you do the majority of your residential HVAC work? (DO NOT READ, ACCEPT UP TO FIVE, PROMPT FOR TOP FIVE IF WORKING IN MANY AREAS) (IF RESPONDENT DOES NOT KNOW COUNTIES, PROMPT FOR CITIES and write in OTHER)

41001 BAKER COUNTY

41003 BENTON COUNTY

41005 CLACKAMAS COUNTY

41007 CLATSOP COUNTY

41009 COLUMBIA COUNTY

41011 COOS COUNTY

41013 CROOK COUNTY

41015 CURRY COUNTY

41017 DESCHUTES COUNTY

41019 DOUGLAS COUNTY

41021 GILLIAM COUNTY

41023 GRANT COUNT

41025 HARNEY COUNTY

41027 HOOD RIVER COUNTY

41029 JACKSON COUNTY

41031 JEFFERSON COUNTY

41033 JOSEPHINE COUNTY

41035 KLAMATH COUNTY

41037 LAKE COUNTY

41039 LANE COUNTY

41041 LINCOLN COUNTY

41043 LINN COUNTY

41045 MALHEUR COUNTY

41047 MARION COUNTY

41049 MORROW COUNTY

41051 MULTNOMAH COUNTY

41053 POLK COUNTY

41055 SHERMAN COUNTY

41057 TILLAMOOK COUNTY

41059 UMATILLA COUNTY

41061 UNION COUNTY

41063 WALLOWA COUNTY

41065 WASCO COUNTY

41067 WASHINGTON COUNTY

41069 WHEELER COUNTY

41071 YAMHILL COUNTY

77777 OTHER (SPECIFY) (Prompt for cities or regions (around cities) if respondent does not know counties)

88888 DON'T KNOW

99999 REFUSED

Q 12. [IF Q 9 =3 ASK:] In which Idaho counties do you do the majority of your residential HVAC work? (DO NOT READ, ACCEPT UP TO FIVE, PROMPT FOR TOP FIVE IF WORKING IN MANY AREAS) (IF RESPONDENT DOES NOT KNOW COUNTIES, PROMPT FOR CITIES and write in OTHER)

16001 ADA COUNTY

16003 ADAMS COUNTY

16005 BANNOCK COUNTY

16007 BEAR LAKE COUNTY

16009 BENEWAH COUNTY

16011 BINGHAM COUNTY

16013 BLAINE COUNTY

16015 BOISE COUNTY

16017 BONNER COUNTY

16019 BONNEVILLE COUNTY

16021 BOUNDARY COUNTY

16023 BUTTE COUNTY

16025 CAMAS COUNTY

16027 CANYON COUNTY

16029 CARIBOU COUNTY

16031 CASSIA COUNTY

16033 CLARK COUNTY

16035 CLEARWATER COUNTY

16037 CUSTER COUNTY

16039 ELMORE COUNTY

16041 FRANKLIN COUNTY

16043 FREMONT COUNTY

16045 GEM COUNTY

16047 GOODING COUNTY

16049 IDAHO COUNTY

16051 JEFFERSON COUNTY

16053 JEROME COUNTY

16055 KOOTENAI COUNTY

16057 LATAH COUNTY

16059 LEMHI COUNTY

16061 LEWIS COUNTY

16063 LINCOLN COUNTY

16065 MADISON COUNTY

16067 MINIDOKA COUNTY

16069 NEZ PERCE COUNTY

16071 ONEIDA COUNTY

16073 OWYHEE COUNTY

16075 PAYETTE COUNTY

16077 POWER COUNTY

16079 SHOSHONE COUNTY

16081 TETON COUNTY

16083 TWIN FALLS COUNTY

16085 VALLEY COUNTY

16087 WASHINGTON COUNTY

77777 OTHER (SPECIFY) (Prompt for cities or regions (around cities) if respondent does not know counties)

88888 DON'T KNOW

99999 REFUSE

Q 13. [IF Q 9 = 4 ASK:] In which Montana counties do you do the majority of your residential HVAC work? (DO NOT READ, ACCEPT UP TO FIVE, PROMPT FOR TOP FIVE IF WORKING IN MANY AREAS) (IF RESPONDENT DOES NOT KNOW COUNTIES, PROMPT FOR CITIES and write in OTHER)

30001 BEAVERHEAD COUNTY

30003 BIG HORN COUNTY

30005 BLAINE COUNTY

30007 BROADWATER COUNTY

30009 CARBON COUNTY

30011 CARTER COUNTY

30013 CASCADE COUNTY

30015 CHOUTEAU COUNTY

30017 CUSTER COUNTY

30019 DANIELS COUNTY

30021 DAWSON COUNTY

30023 DEER LODGE COUNTY

30025 FALLON COUNTY

30027 FERGUS COUNTY

30029 FLATHEAD COUNTY

30031 GALLATIN COUNTY

30033 GARFIELD COUNTY

30035 GLACIER COUNTY

30037 GOLDEN VALLEY COUNTY

30039 GRANITE COUNTY

30041 HILL COUNTY

30043 JEFFERSON COUNTY

30045 JUDITH BASIN COUNTY

30047 LAKE COUNTY

30049 LEWIS AND CLARK COUNTY

30051 LIBERTY COUNTY

30053 LINCOLN COUNTY

30055 MCCONE COUNTY

30057 MADISON COUNTY

30059 MEAGHER COUNTY

30061 MINERAL COUNTY

30063 MISSOULA COUNTY

30065 MUSSELSHELL COUNTY

30067 PARK COUNTY

30069 PETROLEUM COUNTY

30071 PHILLIPS COUNTY

30073 PONDERA COUNTY

30075 POWDER RIVER COUNTY

30077 POWELL COUNTY

30079 PRAIRIE COUNTY

30081 RAVALLI COUNTY

30083 RICHLAND COUNTY

30085 ROOSEVELT COUNTY

30087 ROSEBUD COUNTY

30089 SANDERS COUNTY

30091 SHERIDAN COUNTY

30093 SILVER BOW COUNTY

30095 STILLWATER COUNTY

30097 SWEET GRASS COUNTY

30099 TETON COUNTY

30101 TOOLE COUNTY

30103 TREASURE COUNTY

30105 VALLEY COUNTY

30107 WHEATLAND COUNTY

30109 WIBAUX COUNTY

30111 YELLOWSTONE COUNTY

77777 OTHER (SPECIFY)
(Prompt for cities or regions (around cities) if respondent does not know counties)

88888 DON'T KNOW

99999 REFUSED

DHPs EXPERIENCE

Q16a. In what type of buildings do you install DHPs? (READ 01-05; SELECT MULTIPLE)

01 Single-family homes
02 Multifamily buildings (IF NEEDED: Apartment buildings or condos, including senior or assisted living)
03 Manufactured homes
04 Commercial facilities (IF NEEDED: Non-residential, such as hotels)
77 Other (Specify)
88 (Don't Know)
99 (Refused)

Q16b. [IF Q16a=02] Thinking about your multifamily projects, would you say that the majority of your multifamily projects are…

1 Small buildings - 2-4 units
2 Mid-sized apartments – 5-30 units
3 Large apartment building – more than 30 units
8 (Don't Know)
9 (refused)

IF Q16a only =2 and 16b =2 or 3 (CONTINUE THROUGH Q46, THEN TERMINATE. IT'S A COMPLETE)

(TERMINATE IF Q 16a IS NOT 01, 02, 03 or 77) (if it's only Commercial, DK or Refused)

Next, I'd like to ask about your firm's experiences with residential DHPs that your firm has sold or installed for residential homes, either single-family, multifamily or manufactured homes.

Q 17. In what year did your company install its first residential DHP?

Record INSTALLSTART: _____ as YYYY, or 8888=DON'T KNOW, 9999=REFUSED

Q 15. Thinking back to when you first started installing DHPs, how many DHPs would you estimate your firm has installed in <u>residential homes, either single family, multifamily, or manufactured homes?</u>

[IF DK/REF, ASK:] Can I get your best estimate?

TotResDHPs: _____ 8888=DON'T KNOW 9999=REFUSED

Q 16. [ASK IF Q 15 = 8888 OR 9999] Do you think it's … [READ CHOICES 01-09 only]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

Q16c. Thinking about your business for the past year from a revenue standpoint, of the products you currently carry and install, approximately what percentage of your business is dedicated to DHPs? Your best estimate is fine.

_____ Record DHPBusEst 8888=DON'T KNOW 9999=REFUSED

Q16d Thinking about your business for the past year from an working hours standpoint, approximately what percentage of your installation hours were spent selling or installing DHPs vs. other types of HVAC equipment?

_____ Record DHPHoursEst 8888=DON'T KNOW 9999=REFUSED

If (Q 15 > 0 & Q15 < 8888) **OR** (Q 16 > **0 & Q 16 < 88), set RESexpFlag = YES and CONTINUE; ELSE TERMINATE**

Q 18. Including all equipment and labor, how much does it cost your customers, on average, to install a one-to-one, or "single-head," residential DHP before any rebates or tax credits are applied?

[IF NEEDED:] By one-to-one systems, we mean systems that have one outdoor unit or compressor and one indoor unit or air handler. A multiple headed system would be one that has multiple indoor units or "heads".

[IF DK/REF, ASK:] Can I get your best estimate?

Record InsCost: _____ 8888=DON'T KNOW 9999=REFUSED

Q 19. How many of your total residential DHP installations were completed just in the year 2014? Again, we define residential as either single family, multifamily, or

manufactured homes.

[TRY TO GET THEM TO BE AS SPECIFIC AS POSSIBLE. IF DK/REFUSED ASK:] Can I get your best estimate?][PROGRAMMER: DISPLAY ANSWER TO Q 15/Q16 FOR REFERENCE]

Record Tot2014DHPs: _____ 8888=DON'T KNOW 9999=REFUSED

Q 20. [ASK IF Q 19 = 8888 OR 9999] Do you think it's . . . [READ CHOICES 01-09 only]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200

88 DON'T KNOW
99 REFUSED

If (Q 19 > 0 & Q19 < 8888) **OR** (Q 20 > **0 & Q20 < 88), set 2014Flag = YES AND CONTINUE; ELSE GO TO Q 45**

[GENERATE TOT2014 = Q19 IF (Q19>0 & Q19<8888); else Q20 IF (Q20=01-09); else set to "SYSTEM MISSING"]

Q 21. (IF 2014Flag = Y) How many of those [TOT2014] DHP installations in 2014 received utility incentives?

Record # of Incented installations (Exact or estimated number): _____
8888=DON'T KNOW
9999=REFUSED

[IF DK/REF, ASK:] Can I get your best estimate?

Q 21a. [ASK IF Q21 = 8888 OR 9999] Do you think it's . . . [READ CHOICES 01-09]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

[GENERATE INC2014 = Q21 IF (Q21>0 & Q21<8888); else Q21a IF (Q21a=01-09); else set to "SYSTEM MISSING"]

Q22. **(IF 2014Flag = Y) How many of DHP (TOT2014) installations in 2014 did NOT receive a utility incentive?**

Record # of Non-incented installations (Exact or estimated number): _____
8888=DON'T KNOW
9999=REFUSED

[IF DK/REF, ASK:] Can I get your best estimate?
Q 22a. [ASK IF Q22 = 8888 OR 9999] Do you think it's … [READ CHOICES 01-09]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

Q 24. [(Q22=1-8887) OR (Q22a=01-09)] Why did some installations not get incentives through a utility? [READ LIST IF NEEDED; PROBE TO CODE; MARK ALL THAT APPLY]

1 HOME HEATING FUEL DID NOT QUALIFY
2 INDOOR APPLICATION DID NOT QUALIFY [NOT PRIMARY HEAT OR IN PRIMARY LIVING SPACE]
3 BUILDING TYPE DID NOT QUALIFY (COMMERCIAL, MULTIFAMILY, ETC.)
4 IS NO LOCAL DHP PROGRAM/UTILITY INCENTIVES
5 DISLIKED UTILITY PROGRAM REQUIREMENTS
6 OTHER 1 (PLEASE SPECIFY) _____
7 OTHER 2 (PLEASE SPECIFY) _____
8 DON'T KNOW
9 REFUSED

Q24a. For customers who do not qualify for utility rebates, are you able to offer them any other incentives?

01 Yes
02 No
03 Don't know

Q24b. (If Q24 = 01) What other types of incentives do you offer your customers?

_____ (OPEN END)

CONTINUE IF [(Q22=1-8887) OR (Q22a=01-09)] (they had non-incented residential installations in 2014); Else Go To Q 45

[GENERATE NINC2014 = Q22 IF (Q22>0 & Q22<8888); else Q22a IF (Q22a=01-09); else set to "SYSTEM MISSING"]

Now I have some questions specifically about your 2014 DHP installations that did not receive utility incentives.

Q 25. How many of your [READ IN NINC2014 from Q22] non-incented, residential units in 2014 **were in the following types of projects:**

[BEFORE ACCEPTING A DON'T KNOW/REFUSED, ASK FOR THE RESPONDENT'S BEST ESTIMATE]

Type	Number	Don't Know	Refused
A. Newly built single or multifamily homes?	**RESNC#**	**8888**	**9999**

B. Newly heated areas of single-family home – like new additions, garages or bonus room with no space conditioning?	**SFRNEWSPC#**	**8888**	**9999**
C. Single-family home retrofits?	**SFRRETS#**	**8888**	**9999**
D. Multifamily home retrofits?	**MFRRETS#**	**8888**	**9999**
E. Manufactured home retrofits?	**MANURETS#**	**8888**	**9999**

Q 26. NOT USE

Q 27. NOT USE

Q 28. [IF SFRRETS #> 0 & <8888] How many of your [READ IN SFRRETS #] single-family retrofit installs supplemented or replaced another system?

Record SFRSUPP#: _____ 8888=DON'T KNOW9999=REFUSED

Q 29. [IF SFRSUPP# (Q 28) > 0 & <8888] Thinking about the fuel type for the heating sources in the primary living space, of the **[READ IN SFRSUPP #] supplemental or replacement applications in** (housing type) **how many had: [READ LIST; Enter number from 0-8887 for each; 8888=Don't Know and 9999=Refused; PROBE UNTIL NUMBERS TOTAL TO SFRSUPP#]. How many had…?**

a ELECTRIC RESISTANCE ZONAL HEAT (BASEBOARDS, CADET-STYLE, CEILING CABLE)#
b GAS HEAT#
c ELECTRIC FORCED AIR FURNACE#
d WOOD OR PELLET#
e OIL/KEROSENE HEAT#
f Another type of heat (SPECIFY) _____

Q 30. (IF MFRRETS#> 0 & <8888) How many of your [READ IN MFRRETS#] multi-family installs supplemented or replaced another system?

Record MFRSUPP#: _____ 8888=DON'T KNOW9999=REFUSED

Q 31. (IF MFRSUPP# (Q 30) > 0 & < 8888) Thinking about the fuel type for the heating sources in the primary living space, of these [READ IN SFRSUPP #] supplemental or replacement applications in (housing type) multi-family installs, how many had: the following

heating types in the primary living space? **[READ LIST; Enter number from 0-8887 for each; 8888=Don't Know and 9999=Refused; PROBE UNTIL NUMBERS TOTAL TO MFRSUPP#]. How many had…?**

a ELECTRIC RESISTANCE ZONAL HEAT (BASEBOARDS, CADET-STYLE, CEILING CABLE)#
b GAS HEAT#
c ELECTRIC FORCED AIR FURNACE#
d WOOD OR PELLET#
e OIL/KEROSENE HEAT#
f Another Type (SPECIFY)_____

Q 32. NOT USE

Q 33. (IF MANURETS# > 0 & <8888) How many of your [READ IN MANURETS#] manufactured home installs supplemented or replaced another system?

Record MANUSUPP#: _____ 8888=DON'T KNOW9999=REFUSED

Q 34. (IF MANUSUPP# (Q 33)> 0 & <8888) Thinking about the fuel type for the heating sources in the primary living space, of these [READ IN SFRSUPP #] supplemental or replacement applications in (housing type) manufactured homes, how many had: the following heating types in the primary living space? **[READ LIST; Enter number from 0-8887 for each; 8888=Don't Know and 9999=Refused; PROBE UNTIL NUMBERS TOTAL TO MANUSUPP#].**

a ELECTRIC RESISTANCE ZONAL HEAT (BASEBOARDS, CADET-STYLE, CEILING CABLE)#
b GAS HEAT#
c ELECTRIC FORCED AIR FURNACE#
d WOOD OR PELLET#
e OIL/KEROSENE HEAT#
f Another Type (SPECIFY) _____

Q 14. Thinking about all of your customers, about what percentage of your customers who have electric heat have a central thermostat?

_____% 888=DON'T KNOW 999=REFUSED

Q 35. [ASK IF Q16a=04] **About how many residential-size DHPs – units of 3 tons or less – did your firm install in commercial establishments in 2014?**

[IF NECESSARY:] Examples of a residential DHP installation in a commercial establishment would be server rooms in small offices, and small businesses such as restaurants or cafes.

[IF DK/REF, ASK:] Can I get your best estimate?

Exact or estimated number: _____ 8888=DON'T KNOW 9999=REFUSE

Q 36. [ASK IF Q 35 =8888 OR 9999] Do you think it's . . . [READ CHOICES]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

Q 37. NOT USE

Q 38. What percent of your 2014 residential installations were of the "short run" or "concealed duct" type? [BEFORE ACCEPTING A DON'T KNOW/REFUSED ASK FOR THE RESPONDENT'S BEST ESTIMATE]

[IF NEEDED:] Some manufacturers offer DHP units that allow a short run of ductwork to be connected to a concealed indoor unit. They offer similar features to a true "ductless" heat pump, but incorporate the use of small ducts to distribute hot and cold air. These units are typically called "short run ducted" or "concealed duct" systems. (Did you install any of those in 2014?)

_____% 888=DON'T KNOW 999=REFUSED

Q 39. How many residential cooling-only DHPs did you sell in 2014?

[IF DK/REF, ASK:] Can I get your best estimate?

Exact or estimated number: _____ 8888=DON'T KNOW 9999=REFUSED

Q 40. [ASK IF Q 39 =8888 OR 9999] Do you think it's . . . [READ CHOICES]

Range:

00 NONE
01 1 TO 4
02 5 TO 10
03 11 TO 25
04 26 TO 50
05 51 TO 75
06 76 TO 100
07 101 TO 150
08 151 TO 200
09 OVER 200
88 DON'T KNOW
99 REFUSED

Q 41. [SKIP IF Q39=0 or Q40=00,88,99] What reasons do customers have for wanting cooling-only units rather than heating and cooling units?

Record Response: _____ or 8888=DON'T KNOW 9999=REFUSED

Q 42. [SKIP IF Q39=0 or Q40=00,88,99] Have your sales of cooling-only DHPs increased in the past 12 months, compared to earlier years?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 43. NOT USE

Q 44. Overall, what percentage of your company's non-incented residential installations are one-to-one systems, versus a multi-headed system?

[IF NEEDED: ONE TO ONE SYSTEMS have one outdoor unit (compressor) and one indoor unit (air handler). A MULTIPLE HEADED SYSTEM HAS MULTIPLE INDOOR UNITS or "HEADS".]

[IF DK/REF, ASK:] Can I get your best estimate?

_____%ONE2ONE 888=DON'T KNOW 999=REFUSED

Q 45. Compared to your total 2014 sales of residential DHPs, do you think your sales in the next 2 years will (READ LIST):

5 INCREASE SIGNIFICANTLY
4 INCREASE SOMEWHAT
3 REMAIN ABOUT THE SAME AS 2014
2 DECREASE SOMEWHAT
1 DECREASE SIGINIFICANTLY
8 DON'T KNOW
9 REFUSED

Q 46. (IF Q 45 = 1,2,4 or 5) Why do you say that? (DO NOT READ)

(RECORD ANSWER; PROBE WELL) _____
88 DON'T KNOW
99 REFUSED

[IF Q16b=2 or 3, THANK AND TERMINATE HERE]

Q 47. (IF Q 45 = 4 or 5) Do you expect increases in one-to-one systems, increases in multi-headed systems, or increases in both?

1 ONE TO ONE
2 MULTI
3 BOTH
8 DON'T KNOW
9 REFUSED

Q 48. NOT USED

Q 49. W hich of the following applications have you recommended a DHP for? (READ AND RECORD YES OR NO FOR EACH ONE)

		YES	NO	DON'T	REFUSED
a.	Manufactured homes	1	2	8	9
b.	Multifamily homes	1	2	8	9
c.	Newly constructed homes	1	2	8	9
d.	Spaces like basements, in-laws units, garages – spaces that were previously unheated or are new additions to existing homes	1	2	8	9
e.	Homes with zonal electric heat	1	2	8	9
f.	Homes with wood heat	1	2	8	9
g.	Homes with gas heat	1	2	8	9

h.	Homes with oil heat	1	2	8	9
i.	Commercial spaces	1	2	8	9
j.	Anything else? [IF YES, PLEASE SPECIFY ___]	1	2	8	9

Q 50. NOT USE

Q 51. NOT USED

Q51a. Are there situations where you would not recommend a DHP?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q51b. [ASK IF Q51a=1] What situations would these be?

(RECORD ANSWER) _____
88 DON'T KNOW
99 REFUSED

Q 52. Do you plan to recommend DHPs to your residential customers going forward?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 53. In your opinion, what advantages do you think DHPs offer your customers? [DO NOT READ, CHECK ALL THAT APPLY]

01 MORE EFFICIENT/LOWER OPERATING COSTS THAN OTHER HEATING/COOLING TYPES
02 LOWER INSTALLATION COSTS THAN OTHER HEATING/COOLING TYPES
03 ABILITY TO HEAT **AND** COOL
04 EASY TO OPERATE
05 DON'T NEED FURNACE/CENTRAL AC/DUCTS
06 SAVE ENERGY
07 ZONAL APPLICATIONS/CAN HEAT OR COOL ONE ROOM
08 IMPROVED AIR QUALITY/FILTRATION
77 OTHER (SPECIFY): _____
88 DON'T KNOW
99 REFUSED

Q 54. In your opinion, what are the disadvantages of DHPs? [DO NOT READ, CHECK ALL THAT APPLY]

1 NONE
2 COST – GENERAL
3 COST TO HEAT/COOL MULTIPLE ROOMS OR WHOLE HOME
4 APPEARANCE
5 HARD TO LOCATE/PLACE INDOOR UNITS
6 UNFAMILIAR TECHNOLOGY
7 DON'T WORK WELL IN COLD WEATHER
8 ARE DESIGNED TO HEAT/COOL ONLY ONE ROOM
9 NOISE
10 OTHER (SPECIFY): _____
88 DON'T KNOW
99 REFUSED

MARKETING AND OUTREACH

Now I have some questions about your company's marketing and typical clientele.

Q 55. NOT USE

Q55a. Thinking about your customers, approximately what percentage of your customers are over 45 years of age?

_____ (Percentage)

Q 56a. (If RESexpFlag = Y) About what percentage of your residential DHP customers came to you seeking a DHP? [IF NEEDED: compared to trying to improving their heating or cooling in general, but they didn't request a DHP]

(RECORD ANSWER) _____
888 DON'T KNOW
999 REFUSED

Q 56b. About what percentage of your residential DHP customers came to you seeking to improve their heating or cooling, but didn't specifically request a bid for a DHP? [PERCENTAGES MUST ADD UP TO 100%]

(RECORD ANSWER) _____
888 DON'T KNOW
999 REFUSED

- Percentages from Q56a and Q56b must total 100%

Q 57. (If Q56a=1-100) Has the percentage specifically asking for DHPs been higher in the past 12 months, compared to years past?

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 58. What types of DHP marketing, if any, has your company done? [DO NOT READ, ACCEPT MULTIPLES]

01 NONE – GO TO Q 60
02 PRINT- FLIERS
03 PRINT – NEWSPAPER ADS
04 PRINT – MAGAZINE AD/ARTICLE
05 RADIO
06 TV
07 COMPANY WEBPAGE
08 SOCIAL MEDIA
09 HOME/TRADE SHOWS
10 PHONE CALLS
11 EMAILS
12 OTHER (SPECIFY): _____
88 DON'T KNOW– GO TO Q 60
99 REFUSED– GO TO Q 60

Q 59. Who does your company target in its marketing? (DO NOT READ; ACCEPT MULTIPLES)

Record TARGETS: _____

8 DON'T KNOW
9 REFUSED

Q 60. When you want to introduce customers who are not familiar with the technology to DHPs, which of the following marketing tools do you use? [CHECK ALL THAT APPLY]

1 Marketing materials distributed by the Northwest Ductless Heat Pump Project
2 Marketing materials your firm created
3 Materials your supplier or manufacturer created
4 Talking to them
5 Showing them a display unit
6 Information from the utility or energy efficiency program
7 Or something else (SPECIFY) _____

Q 61. Which of these other types of support, if any, would be beneficial to you? Do you need ….? [CHECK ALL THAT APPLY, READ LIST]

1 ADDITIONAL TECHNICAL SERVICE SUPPORT FROM DISTRIBUTORS
2 ADDITIONAL MARKETING MATERIALS/RESOURCES
3 ADDITIONAL SUPPORT FROM MANUFACTURERS
4 ADDITIONAL SUPPORT FROM THE UTILITY
5 OTHER (SPECIFY:)_____
6 NONE

Q 62. Based on your experience working with customers, what are the key reasons your customers are initially interested in DHPs? [DO NOT READ; PROBE TO CODE; MARK ALL THAT APPLY]

01 TO REPLACE EXISTING UNSATISFACTORY/FAILING EQUIPMENT
02 DON'T NEED DUCTS/FURNACE/CENTRAL AC
03 CAN HEAT/COOL A SPACE NOT SERVED BY THEIR EXISTING HEAT
04 TO ADD COOLING (ONLY) TO A SPACE
05 TO ADD COOLING (ONLY) TO THE WHOLE HOUSE
06 ENERGY EFFICIENCY/LOWER HEATING COSTS/LOWER ENERGY BILLS
07 WANT THE MOST CURRENT TECHNOLOGY
08 ZONAL CONTROL
09 AVAILABLE REBATES
10 AFFORDABILITY
67 OTHER (SPECIFY:)_____
88 DON'T KNOW
99 REFUSED

Q 63. NOT USE

Q 64. NOT USE

Q 65. Among the customers that are aware of DHPs before they meet with you, what are the primary perceived barriers to DHP sales? [DO NOT READ; PROBE TO CODE; MARK ALL THAT APPLY]

0 NONE
1 APPEARANCE
2 COST TOO HIGH
3 EFFECTIVENESS (GENERAL)
4 EFFECTIVENESS IN COLD WEATHER
5 REQUIRES MORE THAN 1 UNIT

6 NOISE
7 MAINTENANCE
8 REBATES UNAVAILABLE
9 DON'T UNDERSTAND TECHNOLOGY
10 LACK OF INTEREST (REASON NOT STATED)
11 NOT VISUALLY APPEALING
12 NOT OFFERED BY EVERY CONTRACTOR
13 IMPROPER INSTALLATION WASTES ENERGY
14 CHALLENGE TO INSTALL BY ONESELF
77 OTHER (SPECIFY:)_____
88 DON'T KNOW
99 REFUSED

Q 66. How important would you say that utility rebates are to residential DHP sales? Would you say they are:

5 EXTREMELY IMPORTANT
4 VERY IMPORTANT
3 SOMEWHAT IMPORTANT
2 NOT VERY IMPORTANT
1 NOT AT ALL IMPORTANT
7 (DO NOT READ) REBATES NOT AVAILABLE IN MY SERVICE AREAS
8 DON'T KNOW
9 REFUSED

Q66a. Do you offer financing to your customers?

1 YES
2 NO (SKIP TO Q69)
3 DON'T KNOW (SKIP TO Q69)

Q66b. (IF Q66a=1) What type of financing do you offer for your customers? (SELECT ALL THAT APPLY)

1 Credit card
2 Utility financing
3 Manufacturer financing
4 Financing through a local bank
5 Home equity loan
6 Other: _____ (Specify)
7 Other: _____ (Specify)

Q 66c. Can you rank the following financing options in order of importance to your business? (READ and RANK)

1 Credit card
2 Utility financing
3 Manufacturer financing
4 Financing through a local bank
5 Home equity loan
6 Other: _____ (Specify)
7 Other: _____ (Specify)

Q 66d. What percentage of your customers end up financing their DHP? Your best estimate is fine.

_____Record DHPFinancing 8888=DON'T KNOW 9999=REFUSED

Q 67. NOT USED

Q 68. How important would you say that financing is to residential DHP sales? Would you say it is:

5 EXTREMELY IMPORTANT
4 VERY IMPORTANT
3 SOMEWHAT IMPORTANT
2 NOT VERY IMPORTANT
1 NOT AT ALL IMPORTANT
8 DON'T KNOW
9 REFUSED

PROJECT SERVICES

Q 69. (If Q 6 = NO) Earlier you said that no one from your company had attended a Contractor Orientation session on DHPs. How likely do you think it is that you will have someone attend in the next 12 months? Would you say it is:

5 EXTREMELY LIKELY
4 VERY LIKELY
3 SOMEWHAT LIKELY
2 NOT VERY LIKELY
1 NOT AT ALL LIKELY
8 DON'T KNOW
9 REFUSED

Q 70. (IF Q 69 = 1 or 2) Why are staff not likely to attend an Orientation session? [DO NOT READ; probe to code; mark all that apply]

1 TOO BUSY
2 NOT LOCAL
3 NOT NEEDED TO INSTALL DHPS
4 HEARD ORIENTATION NOT USEFUL
5 LOW CUSTOMER INTEREST IN DHPS
6 TOO EXPENSIVE/DON'T WANT TO INCUR COSTS
7 OTHER 1, PLEASE SPECIFY:_____
8 OTHER 2, PLEASE SPECIFY:_____
9 DON'T KNOW
10 REFUSED

Q 71. Have you visited the Northwest Ductless Heat Pump Project website? [Note: the address is goingductless.com]

1 YES (CONTINUE)
2 NO (SKIP TO Q 73)
8 DON'T KNOW (SKIP TO Q 73)
9 REFUSED (SKIP TO Q 73)

Q 72. How useful did you find the website information to be? Would you say it was:

5 Extremely useful
4 Very useful
3 Somewhat useful
2 Not very useful
1 Not at all useful
8 DON'T KNOW
9 REFUSED

Q 73. Have you contacted NEEA Ductless Heat Pump program staff?

1 YES (CONTINUE)
2 NO (SKIP TO Q 78)
8 DON'T KNOW (SKIP TO Q 78)
9 REFUSED (S KIP TO Q 78)

Q 74. Regarding what issues or questions? [DO NOT READ; probe to code; mark all that apply]

1 DHP EQUIPMENT ELIGIBILITY

2 UTILITY REBATES
3 MARKETING/PROMOTIONAL ASSISTANCE
4 MASTER INSTALLER ELIGIBILITY
5 TECHNICAL INSTALLATION/BEST PRACTICES
6 OTHER 1, PLEASE SPECIFY:_____
7 OTHER 2, PLEASE SPECIFY:_____
8 DON'T KNOW
9 REFUSED

Q 75. How responsive were the Program staff? Would you say they were:

5 Extremely responsive
4 Very responsive
3 Somewhat responsive
2 Not very responsive
1 Not at all responsive
8 DON'T KNOW
9 REFUSED

Q 76. NOT USE

Q 77. NOT USE

Q 78. Is there any marketing or technical support that the NEEA **Initiative could provide that might help you to increase the number of DHPs you sell? [PROBE:] Specifically, are there any resources that the Initiative could provide?**

1 YES
2 NO
8 DON'T KNOW
9 REFUSED

Q 78a (IF Q78=YES, ASK:) What support or resources do you need: _____

Q 79. Have you heard of the Northwest Ductless Heat Pump Program's "displacement not replacement" approach to DHP installations?

1 YES (CONTINUE)
2 NO (SKIP TO Q 81)
8 DON'T KNOW (SKIP TO Q 81)
9 REFUSED (SKIP TO Q 81)

Q 80. Would you say that your staff has a good understanding of what the Program intends by "displacement not replacement", a fair understanding, or a

poor understanding?

3 Good understanding
2 Fair understanding
1 Poor understanding
8 DON'T KNOW

Q 81. Would you like to offer any comments, either positive or negative, about the Northwest Ductless Heat Pump Program or the ductless heat pump technology?

_____
_____
_____

CLOSING

VERIFY1. (IF WE ALREADY HAVE A NAME) Those are all the questions I have. In case we need to clarify any of your responses later on, can I verify that your name is _____ and that I reached you at _____.

VERIFY2. (IF THERE IS NO NAME) Those are all the questions I have. In case we need to clarify any of your responses later on, may I please have your name?

_____

Thank you very much for helping us with this important study! Have a good day/evening.

A.3 SUPPLIER INTERVIEW GUIDE

Key Research Questions:

	Suppliers
1	How many distributors and retailers in the region are currently offering DHPs? How has this number changed over the last few years?
2	What are the challenges or barriers faced by distributors or manufacturers in offering DHPs to the market? What are the key benefits expressed?
3	In the next five years, where do suppliers see the market headed for DHPs? How can the market be moved further towards transformation? Do suppliers partner with NEEA in promoting DHPs? How satisfied are contractors with this relationship? How could it be improved?
4	How many units are being moved into the Pacific Northwest market? How is this changing by sector in recent years? What are the makes and model of those units?
5	How influential is the DHP Initiative , how engaged are suppliers, where could the program be improved?
6	Are the program goals realistic? From a suppliers' perspective, what will it take for the program to achieve its long-term market transformation goals?

Target Audience: We will be targeting interviews with 5 DHP suppliers, 3 retailers, and 3 manufactured housing firms. Contacts and targeted firms are listed below in Table 1.

Questions are coded so ILLUME staff will know which question are asked of each target audience type.

INTRODUCTION

Email Introduction

Dear _____,

I'm with ILLUME Advising, an energy efficiency program evaluation firm in Madison, Wisconsin. We are currently evaluating the Northwest Ductless Heat Pump Project (the Project) for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing stakeholders in the DHP market to better understand how well the Project is going, and to gather feedback on how it might be improved.

We'd like to schedule a brief 30-minute interview with you to discuss your DHP program and experience working with NEEA. We understand that you may have been contacted as part of the Heat Pump Water Heater Project Market Progress and Evaluation Report and will do our best to keep this conversation brief.

If possible, we'd like to schedule some time within one of the following windows, please let us know what time works best for you:
(OPEN WINDOWS OF TIME)

If you have any questions, please do not hesitate to respond to this email or contact Aaron Winer at aaron.winer@clearesult.com.

Thank you in advance for your assistance.

Telephone Introduction

Hello, my name is _____ and I'm with ILLUME Advising, an energy efficiency program evaluation firm in Madison, Wisconsin. We are currently evaluating the Northwest Ductless Heat Pump Project for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing stakeholders in the DHP market to better understand how well the Project is going, and to gather feedback on how it might be improved.

Is now a good time to talk?
(IF NEEDED) Can we schedule a time to talk for about 30 minutes?

(IF NEEDED: Please know that your answers will be kept confidential and will be grouped with other respondents for reporting in aggregate form only. Neither your name nor company will be mentioned in any reports or documents.)

INTERVIEW GUIDE

Interviewee Role/Background

1) First, can you please describe your role at your company?
    a. How long have you been involved with DHPs?
2) Just to give me a baseline, are you familiar with the NEEA DHP Project and your company's interactions with the Project? (How familiar?)

Sales

3) (Distributors and Retailers) Thinking about your stock in 2014, how many different DHP models did you have in stock? And how many of these models qualified for 2014 NW Ductless Heat Pump Project incentives?

4) (Distributors and Retailers) What models do you have that *don't* qualify? Why don't these models qualify?

5) Have you changed your stocking practices based on 2014 sales? How so, and why?

6) (NOT Manufactured Homes) What are your most popular DHP models? Why are these sales highest?

7) (NOT Manufactured Homes) Has the market share of any of the DHP brands you make/offer changed significantly in the past year? How so? [PROBE FOR NUMERICAL ESTIMATES, by functionality (e.g., heating/cooling v. cooling only]

8) What impact has NEEA's Project had on your sales of [residential DHPs]/[manufactured homes]? Has the Project impacted the types or number of [DHP units]/[manufactured homes] that you…

    i. [MANUFACTURERS and REPS] manufacturer/distribute? [PROBE TO GET NUMERICAL ESTIMATES]

    ii. [DISTRIBUTORS/RETAILERS] keep in stock? PROBE TO GET NUMERICAL ESTIMATES]

    iii. [MANUFACTURED HOMES MAKERS and SELLERS] produce/sell? PROBE TO GET NUMERICAL ESTIMATES]

9) What challenges, if any, have you experienced in meeting demand?

10) In the past year, has the impact of the Project on your [residential DHP sales]/[manufactured homes sales] increased, decreased, or stayed the same? Why is that?

11) How have federal tax credits influenced your DHP business, if at all?

12) (Manufacturers) How does your company accommodate do-it-yourself (DIY) installs in other countries, which have different plug-and-play technology?
    a. How might NEEA address a potential DIY market if DHPs end up in more retailers in the future?
13) (Manufacturers) What would likely be an acceptable rate of return for your company if DHPs installs become DIY in the US?

Marketing

14) (Manufactured Homes) Does your company offer manufactured homes that are DHP ready?

15) (Manufactured Homes) How does your company market manufactured homes that are DHP-ready, or have DHPs already installed? [PROBE: presentations, internet/website, TV, radio, newspaper, social media, in-store promotions, trade magazines]

16) (Others) In the past year, has your company had any marketing efforts for DHPs targeted towards the residential market broadly?

    a. IF YES: What types of activities are included in your marketing strategy? [PROBE: presentations, internet/website, TV, radio, newspaper, social media, in-store promotions, trade magazines]

17) Specifically, who are you targeting with this marketing? (E.g., residential segments, distributors, installers)

18) And what are your key marketing messages? (PROBE for: energy savings, comfort, monetary savings, rebates, etc.)

    a. (Manufactured Homes) Probe to see if DHPs marketing different than for other manufactured homes.

19) In the past year, have you changed your marketing in any way?

    a. IF YES: What changes have you made? [Probe for messaging, channels and amounts]

    b. Why did you make these changes?

20) (Manufactured Homes Only) For the Pacific Northwest, are your company's manufactured homes primarily fitted for multi-headed DHP systems for whole home heating and cooling, or single-head configurations to serve the primary living space? Why is that?

21) (Others) For the Pacific Northwest, does your company's DHP marketing primarily promote multi-headed DHP units for whole house solutions, or one-to-one configurations to displace zonal electric heat? Why is that?

22) [MANUFACTURERS AND MANUFACTURER REPS ONLY]: What is your company's position on working with retailers to stock and sell DHPs?

    a. [IF CURRENTLY WORKING WITH RETAIL] What about this approach has been successful/unsuccessful so far? What, if anything, has been problematic?

    b. [IF CONSIDERING] What are the potential advantages/disadvantages of working with retailers to sell DHPs?

    c. [IF NOT CONSIDERING] Why don't you want to work with retailers on DHPs?

    * [B and C, IF NEEDED]: Do you think that potential for misapplication and improper installation of DHPs could be addressed by implementing a retail sales model whereby sales include the cost of installation through a network of professional installers? Why/Why not?]

Interactions with Installers

23) (NOT Manufactured Homes) Do you rely on installation contractors to market residential DHPs?

    a. If YES: How do you work with contractors, to ensure that they use appropriate messaging?

24) (Manufacturers and Distributors) What technical training do you provide to installers?

25) Are there any technical issues that DHP installers have more difficulties with?

26) (Manufacturers and Distributors) What are the average installation costs for a 1:1 system outside of the Pacific Northwest?
    a. And how do installation costs in the Northwest compare [probe for exact costs]?

27) (Manufacturers and Distributors) Do you see any evidence that utility rebates result in higher prices charged to consumers for DHPs?

    a. If YES: Why do you say that?

28) (Distributors only): Would you sell DHPs to non-HVAC technicians, such as electricians with a refrigerant license?
    a. If NO: Why not?
    b. Do you think a strategy like this could improve market adoption? Why do you say that?

Commercial Sales and Other Home Types (MANUFACTURED HOMES SKIP THIS BATTERY)

For the next few questions, we'd like to know about DHP sales and installations that occurred in 2014.

29) About how many of your DHPs have been installed in small commercial businesses less than 5,000 square feet?
    a. What percent of your total DHPs sales does this represent?
    b. Have these installations increased or decreased in the past 12 months?

30) In your residential sales, do you sell DHPs that are used in manufactured homes?
    a. If YES: How common is this – could you estimate a percentage of your residential sales?

31) Do you sell DHPs that are used in new homes?
    a. If YES: How common is this – could you estimate a percentage?

32) And about what percentage go into attached multifamily housing units?

33) Are there any significant barriers preventing DHPs from being used in manufactured, new or multifamily homes?
    a. If YES: please describe these barriers.

34) Have any of your DHPs been returned due to technical failures?
    a. If YES: Get details on percentage and typical models, reasons

Interactions with Project

35) What involvement have you had with the NW Ductless Heat Pump Project in 2014? (Probe on interactions with Northwest utilities, project staff and installers.]

36) Did you have any Project-related challenges in 2014? [Probe on rebates eligibility, NEEA/ /CLEAResult delivery, installer activities, and equipment issues.]

37) How has the NEEA DHP Project influenced your view of the DHP market in the Northwest?

38) Has NEEA's DHP Project influenced your marketing efforts in any way? [Probe to see if more marketing focused in NW due to rebates, if focusing more on specific home types (e.g., forced air), new messages, etc.)

39) What types of marketing support have you received from NEEA's Project? (PROBE on: ad templates, sales fact sheets, staff training, signage, website or publication content, co-op ad funding, other)

    a. Are there any types of support you would like going forward? If YES: Please explain.

40) Have there been any times when the messaging or marketing efforts of the NW Ductless Project and/or Northwest utilities has conflicted with the marketing or messaging efforts of your company?

    a. If YES: What have you done to resolve the issue?

41) Do you plan to work with the DHP Project in any way in 2015? (Probe on technology training, marketing, funding, etc.)?

Future Expectations

Let's conclude by talking about the DHP market more broadly.

42) What technological trends are you seeing with DHPs?

    a. Are there any new developments with DHPs in cold climate applications?

43) (Manufacturers) Is your company planning any aesthetics changes for inverter driven DHPs?

44) Do you think the price of DHP installations will change in the next 2 years? Five years? If so, how and why?

45) What are your expectations for the future regarding your company's [DHP sales]/[manufactured homes sales] or market share in the Northwest?

    a. How much does this depend on the availability of utility incentives, which can go up to $1,500 per system?

    b. Do you think that your company will be able to keep up with market-demand for [DHPs]/[manufactured homes with DHPs]?

46) (NOT Manufactured Homes) Are there any new or growing market segments for DHPs? [New construction, remodels, manufactured housing, etc.]

47) Are any specific applications for DHPs becoming more popular? [E.g., cooling, converting spaces]

48) (Manufactured Homes) Do DHP-ready homes constitute a strong market for you? How do they compare with other manufactured homes?

49) (Others) How do DHPs compare with other heating and cooling products that you manufacture/carry – do they constitute a strong market for you?

50) What are the primary market barriers to increased [residential DHP sales]/[sales of homes that are DHP-ready]? (Probe on out of pocket cost, economy status, customer awareness, focus on commercial market, etc.)

51) (Manufacturers and Distributors) NEEA has a long-term goal to have DHPs installed in 85 percent of single-family, zonal heat homes in the Northwest by 2029. Currently DHPs have a market share of about 5 percent in this market, and market share has increased about 1 percent annually in recent years.

    a. In your opinion, what things need to occur to achieve this 85 percent goal?

    b. When do you think this saturation level might realistically occur?

    c. Do you have a sense of the DHP market penetration for homes with a forced air furnace?

    d. In your opinion, what do you think needs to happen to increase the market share for forced air furnace homes?

52) [NOT Manufactured Homes, IF NEEDED] In the Pacific Northwest, what proportion of your DHP sales do you expect will be multi-headed DHP units for whole house solutions – (one or more outdoor units with multiple indoor heads) vs. “one-to-one” configurations (to displace zonal electric heat)?

53) Lastly, do you have any other thoughts or comments about DHPs in general, the market, or NEEA’s Project?

Those are all the questions I have for you. Thank you very much for your time.

A.4 PARTNER UTILITY INTERVIEW GUIDE

Key Research Questions:

	Utility Partners
1	Program designs and models, including target markets, messaging approach, incentive levels;
2	Changes in the program and market for DHPs since the last assessment;
3	Barriers and opportunities for the technology from their perspective; and,
4	Usefulness of the NEEA Initiative in supporting their program delivery, and areas for opportunity and improvement.

Target Audience: We will be interviewing up to 20 representatives from NEEA Partner Utilities. Given that several of these individuals will also be responding to the HPWH MPER, if the individual representing the utility has responded to the MPER in the past, we will be asking a limited series of questions designed to understand if there have been changes to the program.

EMAIL INTRODUCTION

Dear _____,

I'm with ILLUME Advising, an energy efficiency program evaluation firm in Madison, Wisconsin. We are currently evaluating the Northwest Ductless Heat Pump Project for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing NEEA's utility partners to better understand how well the Project is going, and to gather feedback on how it might be improved. I realize that you may have been contacted in regards to the HPWH Initiative as well. Please know that we appreciate your assistance with this effort and will do our best to be respectful of your time.

If possible, we'd like to schedule a quick 30 minute interview with you in the next week or two (3/16 -3/27) to discuss your experiences and for you to share any feedback you may have. My colleague Shannon Kahl (cc'd) and I will be following up with you next week via telephone in order to schedule a time for the interview. However, if it is more convenient for you, feel free to reply to this email with a few time windows that work for you and we can confirm the interview time via email.

Finally, just to let you know, your responses from this interview will be kept confidential and grouped with other respondents for reporting in aggregate form only. Neither your name nor utility will be mentioned in any reports or documents.

Please feel free to contact me, the project manager Sara Conzemius (Sara@illumeadvising.com), or Anu Teja with NEEA (ATeja@neea.org) if you have any questions.

I look forward to speaking with you about this effort.

INTRODUCTION

Hello, my name is _____ and I'm with ILLUME Advising, an energy efficiency program evaluation firm in Madison, Wisconsin. We are currently evaluating the Northwest Ductless Heat Pump Project for the Northwest Energy Efficiency Alliance (NEEA). Right now we're interviewing NEEA's utility partners to better understand how well the Project is going, and to gather feedback on how it might be improved.

I realize that you may have been contacted in regards to the HPWH Initiative as well. Please know that we appreciate your assistance with this effort and will do our best to be respectful of your time.

Is now a good time to talk?
(IF NEEDED) Can we schedule a time to talk for about 30 minutes?

(IF NEEDED: Please know that your answers will be kept confidential and will be grouped with other respondents for reporting in aggregate form only. Neither your name nor utility will be mentioned in any reports or documents.)

INTERVIEW GUIDE

Local Utility Program

First I'm going to ask you some questions about your own utility's DHP program. Then I'll ask you some questions about NEEA's Northwest DHP Project.

1) To start off, can you tell us about your current Ductless Heat Pump program?

2) What types of customer homes are you targeting? Do you have plans to target any additional types of customer homes in the future? (IF NEEDED ADD: such as multifamily or manufactured homes)?

3) How are you promoting your DHPs program?
   Probe for:
   - Direct mailings
   - Newspaper ads
   - TV/Radio
   - Social media
   - Internet
   - In store displays
   - Community displays
   - Other

4) From your perspective, what has been the most effective marketing and/or messages in persuading customers to buy DHPs? (PROBE: utility marketing, NEEA DHP marketing, installer marketing)

5) Do you have a DHP display unit?
   a) If so, where is it located? Is it functional, or just a display? Permanently installed?
   b) Is this valuable to you?

6) How do you talk to or educate your customers about DHPs versus their existing system?
   a) Do you talk about displacement theory, i.e., leaving the existing heat in place and adding a DHP?
   b) When talking about DHP installation options, are you primarily focused on 1 head to 1 compressor installation or do you promote other options?

7) Have your promotion efforts increased or decreased in the past year? Why, and how so?

8) In the next 12 months, will your promotion efforts change in any way? If so, how?

9) Has your budget increased or decreased in the past year? Why, and how so?

10) In the next 12 months, will your budget change in any way? If so, how?

11) What rebate amount(s) did you offer in 2014? *Distinguish between: existing SFR – zonal heating, existing SFR – forced air furnace, other existing homes.*

    a) How do these rebate amounts compare to those offered previously?
    b) If different in 2014: Why did you make these changes? (Probe on BPA funding levels, changes in local install costs, shifting utility priorities, other)

c) In the next two years, do you think your DHPs rebate amount(s) will increase, decrease, or remain the same? Why do you say that?

12) What percent of your residential portfolio is allocated to DHP rebates? Has this changed in the past year?

13) What is your utility's long-term vision for DHPs? Is it a high priority measure for your utility, or will other measures be promoted more heavily?

14) Does your utility have an expected time frame for when DHP rebates will no longer be offered? Why is that?

15) Do you offer customer financing for DHPs?
   a) If NO: Why not?
   b) If NO: Do you think your utility will offer this financing in the future?
      i) If NOT, ask why?
   c) If YES: Get details
   d) If YES: What percent of your DHPs customers use this financing if they are eligible?
   e) If YES: What is your perception of your utility's financing options – should they be changed in any way for DHPs in particular?

16) What services, if any, does your utility provide to DHPs installers? (E.g., free or subsidized training, marketing assistance, other? Get details.)

   a) Have any of these services changed in the last year? How so/Why not?

17) Which aspects of your program (e.g., rebates, marketing, technical training, contractor referrals, financing) have had the most impacts on driving customer participation?

18) Have DHPs delivered any non-energy benefits to your customers? If so, please describe.

19) Did you achieve your installation goals for 2014? Why or why not? (Probe on program challenges, successes)

20) Do you have any concerns about the cost-effectiveness of DHPs in your programs?

21) What are the biggest challenges for selling DHPs in your service territory?
   a) Is cold climate an obstacle for installations? If so, how?

22) Were your goals for 2014 different than 2013 (or previous years in general)? If yes, how so?

23) Can you tell me about your QAQC/installation inspection process?

24) How is the inspections process going?
   a) Are you doing mostly random inspections, or are you also doing discretionary inspections to check on specific installers?
   b) Are you having any pervasive problems with any specific installers, or recurring installation issues?

25) Do you need any additional assistance to improve the inspections process in your area?
   a) If YES: What type of additional assistance would be helpful?

Regional Initiative and Coordination

Now I'd like to ask you some questions regarding the Northwest Energy Efficiency Alliance's Northwest DHP Project and then we'll be done.

26) Who is the primary administrator/implementer of your DHP program? (PROBE: Do you process rebates for the equipment or do you have external support for this?)

27) (If utility is primary admin) Do you foresee any changes regarding the implementation of this program in the future?
   a) Is there any area in the implementation that you could envision needing or wanting additional support?

28) (If CLEAResult is main admin provider) How do you use CLEAResult's database, and how well is this working for you [IF NEEDED: I am referring to the database CLEAResult uses for program administration, project tracking, and rebates processing]? For instance, do you use it to run reports to support your own program or reporting to BPA?

29) (If BPA is main admin provider) Please describe how you work with BPA for program administration, project tracking and rebates processing.

   a) How often do you provide data to BPA?
      i) If annual or each 6 months: How difficult would it be to provide data more frequently, perhaps quarterly or monthly?
   b) Do the data you provide include detailed customer information, such as name, address and DHP model?
      i) If not, why?
   c) How well is this process working in your opinion?
   d) What recommendations do you have to improve this process?

30) How well you are able to stay informed about NEEA's current or planned project activities? (PROBE to see if any confusion with BPA's activities)
   a) If YES: Are you or other staff usually able to attend NEEA's webinars covering DHP Project updates?
   b) If YES to main Q: Do you have suggestions for improving communications between the utilities, NEEA, CLEAResult and/or BPA?

31) Have you visited the NEEA DHP Project website in the past 3 months?

   If YES, ask:
   a) How many times?
   b) For what purposes?
   c) Did you find the information you were looking for?
      i) If NO, ask: What other resources did you use to find the information you needed?
   d) Do you have any recommendations for improving the website?

   If NO: Why not?

32) How satisfied have you been with the technical resources that are available through the NW DHP project?

33) And how satisfied have you been with the NW DHP project's marketing support?

34) What features of NEEA's NW DHP project do you like best and have worked well for you?

35) How could NEEA's NW DHP project better support your endeavors? (PROBE to see if any specific marketing to customers or installers needed, other activities).

Those are all the questions I have right now. Thank you very much for your time and good information!